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Descriptors-Elementary School Teachers, *Inservice Teacher Education, *Interaction Process Analysis, *Training Techniques

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An experiment was conducted to determine the efficacy of a self-instructional inservice program in Flanders' system of interaction analysis. Subjects (teachers in nine elementary schools in Tennessee) audiotaped three 20-minute lessons in either mathematics or social studies each week of the 18-week study. The instructional treatment, a one-hour faculty meeting each week, began in the fourth week: three schools received the self-instructional program, three the program augmented with telelecture presentations by a college instructor, and three served as controls. Audio tapes produced by 90 teachers (randomly selected--five taping mathematics lessons and five taping social studies lessons from each school) were collected and rated by a trained staff. Eight Flanders quantitative indexes plus scores on an interaction analysis achievement test served as dependent variables. Results indicated that participants had acquired at least an elementary knowledge of interaction analysis, but differences between instructional modes were not observed. No evidence indicated that the instructional treatments promoted greater teacher indirect influence or student involvement. A postinstruction questionnaire measuring teacher reaction to the project revealed diversity of opinion. (Included are discussion of the findings, a 31-item bibliography, and copies of the questionnaire and achievement test.) (JS)

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THE EFFECTIVENESS OF TWO INTERACTION ANALYSIS INSTRUCTIONAL MODULES WITHIN AN INSERVICE SETTING

Sponsored by The
Appalachian Educational Laboratory
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Subcontract No. 30

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The Bureau of Educational Research and Service
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Bryan performed her duties during the course of the project was deeply appreciated. The investigators are also indebted to Dr. Donald Cruickshank, for not only his assistance, but also for the encouragement that he provided to undertake the project.

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Many persons were involved in the assessment of audio-taped-classroom episodes and the analysis of data. Project personnel especially wish to express their gratitude to the staff of students who rated teacher tapes. Also, the programming assistance provided by Mr. George Worm of the University of Tennessee Computing Center was greatly appreciated.

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Finally, despite the invaluable assistance of the many people who worked on the project, there are undoubtedly weaknesses in the design, implementation, and reporting of the field experiment. The principal investigator must, and does, accept full responsibility for these shortcomings.

JK

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INTRODUCTION

Background to the Study

As a result of the Elementary and Secondary Education Act of 1965, the U. S. Office of Education undertook the establishment of some 20 regional laboratories which were charged with the dual responsibilities of converting knowledges generated from research into educational practices and materials and disseminating these practices and materials to educational practitioners in schools. Each laboratory was to identify the educational needs within its region and design programs to meet these needs. The Appalachia Educational Laboratory (AEL), created to service the Appalachian regions of six states, has identified its principal mission as providing access to quality education in Appalachia by developing and institutionalizing a system of educational practices involving extensive use of communication media and mobile facilities (Annual Report, 1968). It was recognized that attention had to be given to the inservice education of Appalachian teachers, preferably through technological vehicles, if the AEL's goal of access to quality education in the region was to be realized. Specifically, since teachers occupy the most strategic position in the educational process, the need to upgrade the competencies of teachers presently employed in the schools of Appalachia has been identified as one of the AEL's primary concerns.

The need to elevate the training of inservice teachers in Appalachia is well documented. In a recent report by the Education Advisory Committee of the Appalachian Regional Commission (Education Advisory Committee, 1958), it was noted that "the greatest single quantitative and qualitative deficiency (in Appalachian education) lay in teaching and administrative personnel (p. 6)." Further, "remedial action must be taken to train, attract, and retain qualified teachers (p.12)." The Advisory Committee's conclusions were based, in part, upon comparative statistics which show that an inordinate number of Appalachian teachers are approaching retirement age, that teaching turnover is high (over 14% per year as compared to national average of 8.2%), and that 65% of younger teachers leave teaching by the end of their fourth year. Improving the professional skills of currently employed teachers in the region served by the AEL is, therefore, of top priority if the AEL is to significantly promote educational excellence in Appalachia.

Substantial upgrading of inservice teachers by the usual means of advanced university or college course work or workshops was not deemed a feasible approach. The vast numbers of teachers involved combined with the geographic distances and rural isolation which characterizes the Appalachian region all serve to militate against the use of traditional modes of inservice education.

Recognizing this, the AEL has concluded that the geographic and economic obstacles preventing the dissemination of current innovative practice to Appalachian teachers can be overcome only through the use of technology. Specifically, to the extent that self-instructional modules, telelecture, television and other modern modes of communication can be utilized, the teachers of this isolated rural region will be permitted the opportunity of participating in quality inservice programs. The desire of the AEL to improve inservice education through the use of educational technology and communications media stimulated this research in the use of interaction analysis within an inservice context.

Interaction Analysis is a relatively new observational system, developed by Dr. Ned A. Flanders (Flanders, 1960a; Amidon and Flanders, 1967; Amidon and Hough, 1967), that permits an objective analysis of the types and patterns of teacher-student verbal interaction within a classroom. Briefly, the original technique, the Flanders System of Interaction analysis (FSIA), permits the classification of teachers' verbalizations into two major types: indirect influence statements and direct influence statements. The category of indirect influence statements is further subdivided into four more specific types which consist of: (1) accepting feeling, (2) praising or encouraging, (3) accepting ideas and (4) asking questions. Direct influence is subsumed by three types: (5) lecturing, (6) giving directions and (7) criticizing or justifying authority.

Student verbalizations are also categorized in the FSIA through the use of two specific classifications: (8) responding to the teacher, and (9) initiating talk. Behavior other than teacher or student talk is placed in the tenth category which is labeled "silence or confusion." Observers can be trained to rate classroom verbal behavior using the ten category system with a high degree of reliability (Flanders, 1967b).

Instruction in the FSIA was identified by the AEL as a promising and meaningful component of inservice teacher education programs. Knowledge of interaction analysis permits teachers to have a fuller understanding of the nature of their verbal behaviors in their classrooms and the effects of their verbal behaviors on the subsequent verbal responses of students. More important, however, are the emerging relationships, based on research findings, among instruction in interaction analysis, indirect teacher influence and pupil achievement.

The usefulness of interaction analysis instruction in relation to promoting greater indirect teaching behavior (the emittance of more category 1, 2, 3, and 4 statements) is well documented. The results of experimental studies conducted independently by Kirk (1967), Loman, Ober and Hough (1967), and Zahn (1967), among others, show that preservice education majors who receive formal interaction analysis instruction are more likely to assume an indirect teaching posture during their student teaching experience. Although there is a general paucity of research derived knowledge concerning the effects of interaction analysis instruction with inservice teachers, research reported by Flanders (1962), Storlie (1961), and Hill (1966) provides evidence suggesting that interaction analysis training is associated with shifts toward indirect teaching influence.

It is the results of indirect teaching in the classroom, however, that lends significance to instruction in interaction analysis. There is a growing body of evidence to substantiate a relationship, albeit a complex one, between indirect teaching and student outcome. In the first significant empirical investigation of the effects of interaction analysis, Flanders (1960b), working with junior high school teachers, found that greater student achievement was related to indirect teacher influence. Specifically, it was found that teachers who were more successful possessed the capacity to emit both indirect and direct influence statements, depending on the appropriateness of the situation, while unsuccessful teachers failed to demonstrate a capacity to be indirect. Flanders (1967a, pp. 222-223) has labeled the ability to shift in influence pattern from direct to indirect, teacher flexibility. In short, the teachers who obtained the most achievement from their students, the flexible teachers, were, in the long run, more indirect than their less successful counterparts.

Additional research involving student teachers appears to confirm Flanders' finding. For example, Nelson (1966), LaShier and Westmeyer (1967), and Weber (1967) found that indirect teacher influence was positively related to greater student achievement in written language, biology, and "creativity" respectfully.

In summary, the empirically based conceptual relationships between knowledge of interaction analysis and a flexible verbal repertoire and between teacher flexibility and pupil achievement outcome point justifiably to the selection of interaction analysis training for upgrading inservice personnel. It should be noted, however, that the value of interaction analysis for inservice education is far from being determined. As Amidon and Flanders (Amidon and Flanders, 1967, p. 91) have recently pointed out,"...there has been little research on the effects of training experienced teachers in interaction analysis since the initial Flanders' study (1960b) was completed."

Aside from its potential relative to improving the competencies of inservice teachers in Appalachia, instruction in the FSIA does not appear to require an extensive expenditure of time and materials. It was estimated that approximately 12 hours of instruction would enable the majority of educational practitioners to achieve intermediate proficiency in the system. This minimal amount of time lends itself well to the time usually alloted to inservice education in most school systems. An additional advantage of the FSIA is that subject matter and training activities can conceivably be provided by a well designed self-instructional package. Both of these considerations suggest the practicality of disseminating knowledge of interaction analysis on an inservice basis to all teachers in Appalachia.

The above considerations prompted the AEL to commission Dr. Bernard Queen and Dr. Phil E. Suiter of Marshall University to develop a self-instruction program of instruction in the FSIA. The resultant Self-Instructional Program (SIP), designed especially for the use of inservice teachers, consists of an 80 page workbook accompanied by four taped classroom situations.[1] Prior to undertaking an extensive program of disseminating the SIP, the AEL decided to subject the SIP to a field assessment. In October of 1967, the AEL requested the assistance of the Bureau of Educational Research and Service (BERS) at the University of Tennessee to design a field experiment for the purpose of determining both the merits of the SIP as an inservice teaching instrument and the influence that inservice instruction in interaction analysis has on the verbal repertoire of classroom teachers.

Statement of the Problem

The purpose of this research was to determine the effectiveness of the SIP as an inservice instructional package and to assess the effects of inservice instruction in the FSIA relative to promoting the verbal flexibility of teachers. In addition, this research sought to determine which of two methods of instruction, the SIP alone or the SIP augmented with telelecture instruction, was most effective in accomplishing the goals of content mastery and teacher flexibility.

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[1] Interaction Analysis: A Self-Instructional Program for Teachers. Charleston, West Virginia: The Appalachia Educational Laboratory.

The following four specific questions served as guidelines for the investigation:

1. Are teachers able to learn the fundamentals of the FSIA as a result of working with the SIP within the context of a 12 hour inservice course?
2. As a result of working with the SIP, will inservice teachers manifest greater flexibility in their verbal behavior? (See page 12)
3. Will students of teachers working with the SIP display greater involvement in the instructional process as a result of their teacher's training in interaction analysis? (See page 11)
4. Will the effectiveness of the SIP relative to mastering the fundamentals of interaction analysis and promoting greater teacher flexibility be enhanced through the use of accompanying telelecture presentations?

To answer these questions, a field experiment was designed that engaged the cooperation of nine elementary schools in eastern Tennessee. The teaching faculties of three schools were provided 12 weeks of instruction (one hour per week) in interaction analysis using only the SIP developed by the AEL. The faculties of three additional schools worked with the SIP but also had the opportunity to receive instruction via telelecture. The remaining three schools served as controls.

Significance of the Problem

As previously noted, interaction analysis has been identified as one of the most promising recent innovations for teacher education. The conceptual linkage between instruction in interaction analysis and increased indirect teacher influence, and between indirect teaching and higher pupil achievement, strongly suggests the merits of interaction analysis in inservice education. However, almost all knowledge of the effects of interaction analysis training has been derived from research which typically involved small numbers of preservice education majors within the context of the college classroom. Therefore, the expenditure of great effort and massive sums of money by the AEL to provide Appalachian teachers the opportunity to learn this innovative technique at nearby colleges or universities is not only unjustifiable but also impractical.

The numbers of teachers involved, the difficulties inherent in organization, combined with the previously mentioned factor of geographic isolation limit the value of traditional evening college or extention courses as a vehicle for large scale diffusion of innovated practice. The college sponsored workshop, for these very same reasons, also possesses this disadvantage. At the present time in Appalachia, the disadvantages of traditional modes of dissemination can be overcome only through the utilization of educational technology. To be both practical and economical, innovative practice must be disseminated by means of self-instructional packages, telelecture, television or other such media. The necessity to employ media in any large scale attempt to upgrade the skills of Appalachian teachers ascribes particular importance to the study.

Several significant questions must be partially answered before the AEL can justifiably embark upon a large scale attempt to promote the SIP in interaction analysis for inservice use. Obviously, the first consideration is the effectiveness of the SIP as a teaching device. Specifically, is the SIP constructed so that typical teachers can significantly benefit from its contents with a minimal expenditure (approximately 12 hours) of release time? Evidence relating to the effectiveness of the SIP as an instructional device will, of course, be of significant and obvious value to the AEL as well as the educational profession. But of equal relevance to the AEL's decisions concerning inservice programs is the question of behavioral change. An extensive promotion of interaction analysis instruction will be difficult to justify if it cannot be demonstrated that as a result of training in this technique, teachers perform more "effectively" in their classrooms. Recall that the AEL's ultimate objective is the promotion of quality education throughout its geographic area of responsibility. The research to be described attempts to resolve, in part, those questions that will enable the AEL to make sound decisions pertaining to its strategy to upgrade inservice teaching skills through media based instruction in interaction analysis.

Definitions and Assumptions

There are terms peculiar to interaction analysis and several stipulative definitions employed in this research that deserve further clarification.

Indirect teacher influence. The emittance of four classifications of teacher statements comprise indirect teacher influence. Generally indirect teacher statements tend to encourage the student to participate in the lesson. In the FSIA, which is a ten category system, categories one, two, three, and four denote indirect teacher statements. The following constitutes a brief description of each type of statement:

1. ACCEPTS FEELING: accepts and clarifies the feeling tone of the students in a nonthreatening manner. Feelings may be positive or negative. Predicting and recalling feelings are included.

2. PRAISES OR ENCOURAGES: praises or encourages student action or behavior. Jokes that release tension, not at the expense of another individual, nodding head or saying "uhhuh?" or "go on? are included.

3. ACCEPTS OR USES IDEAS OF STUDENT: clarifying, building, or developing ideas or suggestions by a student. As teacher brings more of his own ideas into play, shift to category five.

4. ASKS QUESTIONS: asking a question about content or procedure with the intent that a student answer.

Direct teacher influence. Statements which are emitted by teachers which tend to restrict the students' freedom to respond constitute direct teacher influence. In the FSIA, classifications five, six, and seven describe these statements and a summary of each follows:

5. LECTURES: giving facts or opinions about content or procedure; expressing own idea; asking rhetorical questions.

6. GIVES DIRECTIONS: directions, commands, or orders with which a student is expected to comply.

7. CRITICIZES OR JUSTIFIES AUTHORITY: statements intended to change student behavior from nonacceptable to acceptable pattern, bawling someone out; stating why the teacher is doing what he is doing, extreme self-reference.

Student participation. Two categories, categories eight and nine, are devoted to describing the nature of student participation in the Flanders System. The categories are labeled _student talk-response_ and _student talk-initiation_ respectively. These two types of student participation are defined as:

8. STUDENT TALK-RESPONSE: talk by students in response to teacher. Teacher initiates the contact or solicits student statement.

9. STUDENT TALK-INITIATION: talk by students, which they initiate. If "calling on" student is only to indicate

who may talk next, observer must decide whether student wanted to talk. If he did, use this category.

Student participation, as it shall be used in the following report, refers to the relative amount of student talk (either categories eight or nine) observed in a lesson. To the extent that students talk at the expense of teacher talk, greater student participation is being realized.

Student involvement. Examination of the two classifications of student talk reveals that student talk-initiation describes a qualitatively "higher" degree of student participation. Student talk-initiation frequently involves spontaneous contributions, the expression of a student's own ideas, and student-to-student communication. For the purpose of this research, the degree of *student involvement* is the extent to which student talk can be classified as self-initiation. The greater the relative frequency of category nine statements to category eight statements, the greater the student involvement.

Silence or confusion. In order for the FSIA to be an inclusive and exhaustive system of verbal classification, it is necessary to provide a category which includes verbalizations and classroom activities that are not compatable to the previously described nine categories. This "catch-all" category is loosely defined as:

10. SILENCE OR CONFUSION: pauses, short periods of silence, and periods of confusion in which communication cannot be understood by the observer.

Telelecture. Telelecture is a mode of audio communication which utilizes telephone lines and which amplifies the audio message at one or more stations thus permitting group participation. An instructor at one location, for example, could deliver his lecture over the system and the group at the receiving location not only hears the lecture but may participate by asking questions, etc.

Teacher flexibility. The ability of the teacher to exercise the full range of teacher statements (categories one through seven) serves as the generic definition for teacher flexibility in this research. A flexible teacher is one that will in the long run assume a more pronounced indirect teaching posture than the non-flexible teacher who manifests sustained direct teaching influence.

One of the principal purposes of this research is to determine if knowledge of interaction analysis will enable teachers to more fully exercise their indirect verbal repertoire and thus achieve a greater degree of flexibility. Implied by this purpose are the assumptions that typical inservice teachers lack the degree of verbal flexibility that is associated with optimum pupil achievement and that inflexibility is a function of extended direct influence. Flanders (1965), among others, has shown that approximately two thirds of the time, the typical classroom teacher is using direct influence. Abundant research, however, has demonstrated that the desirable state of affairs is the incrementation of indirect influence by teachers thus expanding their capacity to be flexible. Therefore, if evidence generated by this investigation indicates that teachers who have been trained in interaction analysis exert more indirect influence in their classes, it is assumed that greater verbal flexibility has been achieved.

Limitations

The use of interaction analysis for research purposes and the involvement of many schools in an actual field experiment immediately suggests two important potential limitations. Both limitations are methodological and pose potential threats to the validity of the experiment.

The first methodological concern is the obstrusive and reactive nature of audio tape recorders which were present in classrooms for the purpose of obtaining basic data. The presence of tape recorders in the classrooms of participating teachers create, to some degree, a novel situation which may have resulted in findings which were partially an artifact of either reactive arrangements (the Hawthorne effect) of the interaction of reactive arrangements with the instructional treatments. Relative to the latter, it is conceivable that the results of instruction in interaction analysis would have been different had knowledge of participation in an experiment and the tape recorders been absent. The threat, especially to the external validity of the study, caused by the reactive nature of the tape recorders is difficult to control even in a laboratory setting and, it must be conceded, it represents a viable concern in this research.

The second methodological weakness that must be recognized was the inability to utilize complete randomization in the selection of schools and the assignment of schools to experimental treatments. (Randomization is necessary to comply with the assumptions of the parametric statistical procedures employed in analysis of data). This limitation is common to educational experiments that require the use of classrooms and schools. However, as subsequent discussion will show, random procedures relative to school selection and assignment were used whenever and wherever possible during the conduct of the field experiment.

RELATED LITERATURE

This research was concerned with the Appalachian teacher's instructional behavior in the classroom as influenced by an inservice training program. Teaching, in general, consists of ways of engaging in exercises and activities, classroom control techniques, instructional procedures, and methods of evaluating the results of the educative process (Smith, 1963). Flanders (1965) has demonstrated that the teacher's behavior has an important influence on classroom behavior. Further, Flanders' findings suggest that in most public school classrooms, sixty per cent of the time someone is talking and that seventy per cent of the time it is the teacher. Implications from such data support the need to investigate instructional behavior, particularly the verbal behavior of teachers as they interact with students.

Cogan (1967) has investigated relationships between teacher behavior and student behavior and asserts the need to search for existing cause and effect relationships. Withall (1967), as a result of his studies of teacher behavior, claims that the affects of the emotional components of transactions occurring in a teacher's classroom are largely determined by the teacher's verbal behavior.

For years, educators have been seeking the development of techniques for observing and analyzing the behavior of teachers in the classroom. In recent years, scientific instruments for the measurement of classroom behavior have appeared in research conducted by Withal (1967), Medley and Mitzel (1958), Ryans (1960), Flanders (1960), Hughes (1959), Hough (1967), and others. These researchers have developed systematic techniques for observing the verbal behavior of teachers which may provide more bases for analyzing teacher performance.

H. H. Anderson (1967) has researched the integrative and dominative behavior of teachers in their contacts with children. He defined domination as the behavior of a person who is inflexible, rigid and deterministic, who disregards the desires or judgment of others, and who in the conflict of difference has the answers. He identified integrative behavior as being flexible, adaptive, objective, scientific and as an expression of the operation of democratic process. After observing numerous teaching sessions in typical classrooms, he found the frequency of dominative contacts by each teacher to be at least twice the frequency of integrative contacts. These findings strongly suggest the need to modify the inflexible posture of the majority of practicing educators.

The effects of three different roles of leader behavior on children's groups were investigated by Kurt Lewin, Ronald Lippitt, and Ralph White (1939). The three leadership roles were established as autocratic, democratic, and laissez-faire. In their first experiment, they observed a significant amount of aggression and hostility in the autocratic leadership experiment, which was directed toward certain scapegoats when the leaders were absent from the group. In a second experiment the boys in four out of five autocracies showed an extremely nonaggressive and apathetic pattern of behavior. Other results accrued from these experiments, but the affects of dominative behavior on the part of the autocratic leaders have the most salient implications for the behavior for the teachers. Teachers who consistently employ autocratic and dominative behavior with their students may create an extremely negative or apathetic learning climate for many students. Anderson and the latter researchers thus provided some of the most significant early research relative to describing teacher behavior and exploring certain teacher (leader) behavior patterns which may both inhibit and facilitate the development of a social-emotional climate conducive to learning.

One of the earliest category systems developed to analyze classroom verbal behavior with respect to the classification of teacher statements was that of John Withall (1949). Withall's system reserved three categories for learner-centered behavior, three for teacher-centered behavior, with a seventh category designated as a neutral classification.

N. O. Flanders has developed a ten category interaction analysis system for the classification of verbal behavior. This system, which has emerged as the most popular system within the educational profession, was selected for use in this study. It should be noted that of the total complex called "teaching," interaction analysis applies specifically to the content-free characteristics of verbal communication.

During the period 1954 to 1957, Flanders (1967) conducted studies, both in this country and in New Zealand, focusing on the constructive attitudes of students and how these attitudes compared with teacher influence patterns. Analyzed data disclosed a definite relationship between the verbal statements of the teacher and corresponding attitudes among students. A subsequent study conducted by Flanders (1965) revealed that, in general, students achieve more on cognitive tests when they are taught by teachers who utilize more indirect rather than direct verbal patterns of behavior.

Research evidence is accumulating to support the claim that training in interaction analysis sometimes effects the verbal behavior of inservice and preservice teachers. Kirk's study (1967) involving preservice teachers, reports that indirect student teaching and training in interaction analysis appeared to be related. There was evidence that student teachers seemed to assume a more indirect tendency in their verbal behavior, but that this tendency is significantly accelerated for those preservice teachers who have knowledge of interaction analysis.

A project to study the effects of training preservice teachers in interaction analysis on subsequent teaching experiences was directed by Hough and Amidon (1967). Supervisors, who had no previous experience in interaction analysis, evaluated the teaching performances in a conventional manner. Student teachers who had training in the Flanders' system were rated significantly superior to a control group. This generalization must be limited because the control group did not receive the special teaching-learning sessions and laboratory experiences provided the experimental group. Ned Flanders (1962) directed an inservice project in 1960-61 employing interaction analysis both as a training tool for participant use as as a research tool for studying the verbal behavior of the participants in their classrooms. The subjects exhibited significant gains with respect to the incremented use of indirect statements in comparison to pretraining levels of indirect statements usage. Storlie (1961) investigated the relationship between several characteristics of of inservice teachers and change in their verbal behavior following an inservice course in interaction analysis. The inservice program produced a significant increase in the use of indirect influence by all but 14 of the 51 teachers, but relationships between personality characteristics and change in indirect influence were not found.

In summary, a review of the literature relating to the nature of teacher verbalizations reveals that the majority of teachers fail to exhibit a flexible and indirect verbal repertoire. This finding is disconcerting in light of emerging evidence from which a positive relationships between indirect influence (teacher flexibility) and student achievement can be inferred. However, attention on the part of teachers to their patterns of classroom verbal interaction appears to promote greater teacher flexibility and indirect influence. Morever, the FSIA has been shown to be a vehicle that holds promise for the realization of greater flexibility.

METHOD

Selection of the Sample

In late November, 1967, Dr. Wayne Myers, Tennessee Field Representative for the AEL, secured the interest of seven eastern Tennessee school systems in the interaction analysis field experiment. The seven districts, three county systems and four city school systems, which expressed a desire to participate in the experiment represented all public schools in Roane, Morgan, and Anderson Counties in eastern Tennessee.

Totally, the student population in the three counties is approximately 30,000 and almost every type of school organization and every size of school is represented. Although these Appalachian counties are predominantly rural, over 40% of the inhabitants reside in four small cities, the largest of which has a population of 27,000. Barren coal mining areas are readily identifiable but at the same time this area can boast of the nationally known scientific and industrial complex at Oak Ridge. In most respects, therefore, the seven school districts which comprise Roane, Morgan and Anderson Counties represent a cross-section of Appalachian education.

In mid-December of 1968, arrangements were made by the AEL for the project's staff to formally meet with the seven superintendents for the purpose of (a) explaining, in greater detail, the nature of the proposed investigation and (b) obtaining the commitments of the seven superintendents relative to their systems participation in the study. A presentation of the experiment's purpose and scope was made, and general consent to conduct the investigation was given, provided that a modification in the proposed sampling selection plan be made. Specifically, the initially proposed sampling procedure called for a completely random selection of nine elementary schools, employing at least ten full-time teachers, from the total number of such schools in the three counties. However, the superindentents collectively expressed the desire to have at least one school in each of the seven systems selected as an experimental school. The school systems' enthusiastic participation was contingent upon the satisfaction of this request. That is, the school officials would have been reluctant to participate if their schools served exclusively a control function. These researchers, therefore, provided the superintendents with the assurance that modifications would be made in the original selection procedures so as to insure that at least one school within each system received an experimental treatment, i.e., inservice instruction in interaction analysis.

At the request of the project's staff, each superintendent completed and returned by mail a brief informationnaire for each elementary school under his jurisdiction that had a teaching staff in excess of ten teachers and that presented no unusual problems that would prevent participation. The school informationnaires also contained information that assisted these investigators in selecting and contacting the schools. (See Appendix A) From a total of 15 suitable schools, one from each of the seven districts was randomly selected to receive an inservice instruction program (experimental schools).[1] Three schools from the remaining eight were, in turn, randomly designated as control schools. Shortly after notification of being selected as an experimental school, one school, as a result of faculty resistance, chose not to participate in the study. Therefore, the cooperation of nine schools, six experimental and three control, was finally obtained.

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[1] If, for example, a school system submitted two eligible schools, the selection of the school that was to receive the inservice course was made randomly.

Random procedures were also employed in the assignment of the six experimental schools to specific levels of treatment.[2] That is, three schools were randomly selected to participate in inservice instruction in Interaction Analysis using only the SIP (SIP-Only) while the remaining three schools used the SIP in addition to telelecture instruction (SIP--Telelecture). The number, age, and years of experience of participating teachers by schools and treatment level assignment are presented in Table 1.

Procedures

Orientation meetings with faculties. One week prior to the initiation of the experiment, members of the investigating team met with the faculties of the nine participating schools for the dual purpose of soliciting their cooperation and explaining the nature of the inservice activity.[3] During the orientation session, the teachers in the six experimental schools were told that they were to take part in a special in-

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[2] A modification had to be made in the random assignment of schools to treatments. One school assigned to the SIP-Telelecture treatment was unable to receive the telelecture transmissions because it was serviced by only one telephone line. And since telelecture transmissions would preclude any form of telephone communication during those times, a decision was made to assign this particular school the SIP treatment.

[3] In several incidences, a second visitation by staff members had to be made to the schools. The second visitation was necessary because the initial one-hour faculty meeting did not provide sufficient time to convey all essential details relating to the teacher's responsibility in the experiment and answer the many questions brought forth by the faculty. Parenthetically, the teacher's greatest concern, as reflected by their questions, was the taping assignment.

TABLE 1

The Number, Mean Age, and Mean Years of Teaching Experience of Participating Teachers By School and Treatment Assignment

Treatment Assignment	School Code	Number of Teachers	Mean Age	Mean Years of Experience
SIP-Only	A	10 (2)[a]	42	15
	B	10	40	11
	C	12 (2)	39	15
SIP-Telelecture	D	11	39	9
	E	14	38	13
	F	16	54	23
Control	G	16 (1)	44	17
	H	14 (1)	45	15
	I	11 (1)	46	23
Totals		114 (7)	43	16

[a] The figure contained in parentheses indicates the number of male teachers comprising the total.

service course utilizing the SIP (or the SIP plus telelecture) which would meet one hour a week for twelve consecutive weeks. Specific arrangements relating to the time of day and the school location in which the inservice class would be held were left to the respective school administrations.

Taping classroom lessons. The greater portion of each of the orientation meetings, however, was devoted to an explanation of the audio tape recording assignments which accompanied participation in the inservice program. Teachers were informed that beginning the following week, and extending throughout an eighteen week period, they were each to tape record three twenty-minute lessons per week. The twenty-minute lessons were to be of a conversational nature; lessons consisting of film presentations, silent reading, or desk work, etc. were not suitable for taping. Moreover, one-half of the faculty were informed that they were to record only lessons in mathematics while the remaining half were to record only lessons in the social studies as it is broadly defined at the elementary level. Subject matter designations had been made prior to the faculty meeting using random procedures. The only explanation offered to the cooperating faculties for the taping assignments was that lesson taping was necessary to properly evaluate the inservice course that they were to receive. (Specific details concerning the use of recordings in the evaluation process were not disclosed.) Teachers were assured, however, that the audio tapes would be forwarded only to the BERS at the University of Tennessee and would not be monitored or in any way utilized by local school officials. The major points stressed during the organizational faculty meetings were also contained on two page mimeographed handouts that were distributed to faculty members during the meeting. These descriptive handouts, entitled "An Overview of the Interaction Analysis Project," and which summarizes the relatively standardized presentations made to each of the three types of schools (SIP-Only, SIP-Telelecture, and Control) comprise Appendix B.

The orientation presentation made to control school faculties did not include an extensive discussion of either interaction analysis or the planned inservice course in interaction analysis. These faculties were told only that their assistance was needed (a) to help in the evaluation of inservice courses being conducted in eastern Tennessee and to (b) provide taped classroom episodes to "develop and refine" these courses. (See Appendix B.)

In addition to discussing the proposed inservice course and the concommitant taping assignment, demonstrations concerning the use of tape recorders and the coding system devised for the project were conducted during these initial meetings. Portable Craig Model 212 tape recorders were disturbed to participating teachers, one recorder for every two teachers, for project use. The recorders could be operated by either battery or electric power. Teachers were not only instructed in the proper use of the recorders but were also taught how to properly label completed tapes so that they could be identified by the project's staff. The coded labeling system, fully described in Appendix C, enabled the investigating team to classify a completed taped lesson by school, teacher, grade level, date and subject matter area. Arrangements were made with the respective school administrations to exchange fresh and completed tapes through the U. S. mails on a bi-weekly basis.

The taping of three twenty-minute lessons each week by all full-time faculty members in the nine cooperating schools commenced the second week of January, 1968. This schedule of lesson taping was maintained for 18 consecutive weeks excluding, of course, weeks in which schools were closed for vacations.[4]

Experimental Treatments

As previously noted two experimental conditions plus a control situation were established to satisfy the objectives of this study. The experimental condition consisted of two approaches to inservice instruction in interaction analysis. These instructional approaches and the temporal structure of the experiment are described below.

The self-instructional program only (SIP-Only). The faculties of three schools used only the SIP as the basis for the inservice course. Arrangements were made to permit school faculties to meet formally one hour each week for a period of twelve weeks for the purpose of working with the SIP. Teachers were encouraged by both the project's staff and respective principals to work with the SIP in small groups of between two and four teachers. The groups were "loosely" supervised by the school principal. The faculty study groups were instructed to progress at a rate that would enable them to complete their study of the SIP by the twelfth scheduled meeting. Since the SIP is organized into nine sessions(chapters) it was suggested that this could probably best be accomplished by attempting to cover approximately one session each week. Independent study of the SIP either during free period or at home was intentionally left to the desires of the individual participants. Since the intent was to establish a realistic inservice situation, it was reasoned that in the typical inservice course, some teachers devote extra time and effort to the course materials while others would not. Therefore, imposing restrictions relative to the "extra curricular" use of the SIP would not only be unenforceable but would be also atypical and artifical.

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[4] A significant deviation in the taping schedule occurred for one of the SIP-Only schools. Due to faculty communication and an exceptionally early school closing date, the teachers in this school failed to record lessons during the last three weeks of the 18 week program. This deviation necessitated certain adjustments in the statistical treatment of data which are described in greater detail in Chapter 4.

Self-instruction program plus telelecture (SIP-Telelecture). The organization of the SIP-Telelecture course, implemented in three schools, was similar in most respects to that in the SIP-Only schools except for telelecture presentations. Specifically, only the first thirty minutes of each inservice class meeting was devoted to an examination of the SIP by the teachers working in small groups. The remaining half-hour consisted of lecture and discussion of the principles of interaction analysis through the medium of telelecture. The instruction via telelecture was provided by Dr. Barbara Tea, Assistant Professor on the faculty of the College of Education, University of Tennessee.[5] In her telelecture presentations, Dr. Tea reviewed and attempted to clarify the subject matter contained in the SIP. In addition, she attempted both to encourage discussion among group members and to answer questions presented to her by the group relating to the subject matter.

Control condition. The three remaining schools did not receive instruction in interaction analysis. Their participation in the field study included only the taping of three lessons each week for the duration of the 18 week period.

Temporal organization. The field experiment, as previously noted, extended over an 18 week period. The first three weeks of the 18 week period consisted of only lesson taping, i.e., three lessons each week in either mathematics or social studies. Data obtained from each of the nine schools during this three week *base period* provided an estimate of classroom verbal interaction patterns prior to exposure to interaction analysis instruction. In effect, the base period served as a "control" period to which subsequent effects were related for the purpose of ascertaining change due to instruction in interaction analysis.

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[5] Dr. Tea has offered formal interaction analysis instruction in the College of Education's preservice teacher education program and has used interaction analysis extensively with student teachers.

Formal inservice instruction in the FSIA, utilizing either the SIP-Only or the SIP-Telelecture model, was initiated in the six experimental schools during the fourth week. One hour each week for 12 weeks was devoted to inservice instruction. During this interim, the established schedule of lesson taping was maintained.

The last three weeks of the 18 week period was devoted exclusively to a continuation of the lesson taping schedule. Data obtained from this period enabled an assessment of the "post experimental" effects of the inservice programs. The principal temporal segments with associated activities are summarized by the diagram presented in Figure 1.

Sources of Data

Two instruments, a teacher questionnaire and an objective content examination, in addition to the taped classroom episodes provided by the participating teachers constituted the principal sources of data for this research.

The questionnaire and content examination. The questionnaire was designed to elicit both biographical information and the participating teachers' subjective evaluation of the total research project. The questionnaire is presented in Appendix D. The content examination consisted of 43 objectively scored test items (multiple-choice, matching, etc.) which was developed by Dr. Phil Suiter, co-author of the SIP. The content examination served to provide information which related to the first question posited in the statement of the problem, i.e., are teachers

PERIOD	Base	Experimental	Post-Experimental
WEEKS	1, 2, 3,	4, 5, 6, ... 13, 14, 15,	16, 17, 18.
School			
A	lesson taping	SIP-Only and lesson taping	lesson taping
B	lesson taping	SIP-Only and lesson taping	lesson taping
C	lesson taping	SIP-Only and lesson taping	lesson taping
D	lesson taping	SIP-Telelecture and lesson taping	lesson taping
E	lesson taping	SIP-Telelecture and lesson taping	lesson taping
F	lesson taping	SIP-Telelecture and lesson taping	lesson taping
G	lesson taping	lesson taping	lesson taping
H	lesson taping	lesson taping	lesson taping
I	lesson taping	lesson taping	lesson taping

Figure 1. The principal temporal segments with corresponding activities which together depict the basic structure of the field experiment.

able to learn interaction analysis within an inservice context? Examination items were constructed to test teachers' ability to recognize fundamental knowledges contained in the SIP. Appendix E contains a sample copy of the content examination. Both the questionnaire and content examination were administered to the participating faculties during the week following the termination of the inservice course, i.e., the sixteenth week of the project.[6]

Parenthetically, the content examination was also administered to a class of preservice education majors taught by Dr. Barbara Tea, the project's telelecture instructor. Prior to the administration, the 20 University of Tennessee undergraduates had been exposed to approximately 12 hours of formal in-the-class instruction in the fundamentals of interaction analysis concurrent with the field experiment. Since the same instructor was teaching essentially the same subject matter at approximately the same time, these additional data resulting from the preservice group permitted a quasi-experimental comparison between inservice and preservice instruction in interaction analysis.

Tape analysis. Data relating to an assessment of teacher flexibility and student involvement were obtained from an extensive analysis of taped lesson episodes. Specifically, selected returned audio tapes were rated according to the FSIA by a panel of trained undergraduate raters. Within each of the nine schools, ten teachers, five who had recorded social studies lessons and five who had recorded only mathematics lessons, were randomly identified and each week, one of their tapes was rated.[7] The selection of one tape each week from the three submitted by a selected teacher was also done randomly. In short, 18 rated tapes, one from each of the 18 weeks, were generally available for each of the ten teachers identified within a given school. Teacher tapes, in addition, were randomly distributed to members of the student rating panel.

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[6] The three control schools were not administered the content examination since faculty members did not have the opportunity to be exposed to interaction analysis. However, the control faculties did complete a modified form of the teacher questionnaire.

[7] For schools A and B, which had total faculties of only 10 teachers, one tape a week was analyzed for all teachers.

The training of the undergraduate raters was accomplished by Dr. Tea. Attempts were made to hire raters who had had some prior experience with interaction analysis so that their training could begin at an intermediate level. Initially, the rating panel consisted of 12 students who received approximately 14 hours of instruction and supervised practice under Dr. Tea's direction. Previous to rating lesson tapes submitted by participating teachers, raters were required to analyze a sample taped classroom episode and Scott's pi coefficients (Scott, 1955) were computed between all combinations of raters for the purpose of assessing interjudge reliability. (The use of Scott's pi coefficient to assess rater reliabilities is commonly found in the interaction analysis literature.) The resulting mean pi coefficient was computed at .92 and the lowest pi coefficient between a pair of raters was found to be .85.[8] An examination of the pi coefficient matrix (see Appendix F) reveals that a more than satisfactory degree of interjudge reliability had been achieved as a result of the training session.

To insure that the high degree of rater consistency was maintained, two additional complete pi coefficient matrices were constructed and evaluated. The first complete reliability check was made at the approximate midpoint of the duration of the study while the second occurred during the final weeks of rating.[9] In both instances, these data suggested that rater reliability had been maintained. Appendix F contains these data.

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[8] Originally, 14 students had participated in the training sessions, however, two students failed to demonstrate the degree of rater reliability desired (pi .85), and thus were informed that their services were not needed.

In addition, at periodic intervals between the complete reliability assessments, smaller pi coefficient matrices based on a random sample of raters (n=5) were constructed and evaluated. These periodic "quality control" checks were designed to detect marked rater unreliability before it could seriously effect the data.

Statistical Design

To assess teacher behavior change as a function of inservice instruction in interaction analysis, a 3 x 3 x 2 x 6 mixed design was employed. The design permitted an evaluation of the main and interactive effects of the following four variables for various selected performance measures:

1. Instructional treatments (abbreviated I)
    a. I_1 = SIP-Only
    b. I_2 = SIP-Telelecture
    c. I_3 = Control
2. Schools (abbreviated K) - three different schools nested within each level of I
3. Subject matter taught (abbreviated S)
    a. S_1 = mathematics
    b. S_2 = social studies

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[9] As anticipated, there was a gradual reduction in the number of student raters employed as the project progressed. The attrition was due to factors such as early graduation, demanding academic schedules, marriage, etc.

4. Temporal periods (abbreviated P)

    a. P_1 = pre instructional base period, i.e., weeks 1-3
    b. P_2 = first three weeks of instruction, i.e., weeks 4-6
    c. P_3 = weeks 7-9
    d. P_4 = weeks 10-12
    e. P_5 = weeks 13-15
    f. P_6 = post instructional period, i.e., weeks 16-18

The design structure was moderately complex and can be best described statistically by the following model,

$$\begin{aligned} X_{ijklm} = {} & I_i + KI_{i/j} + S_k + IS_{ik} + KSI_{jk/i} + TKSI_{l/jk/i} \\ & + P_m + IP_{im} + KPI_{jm/i} + SP_{km} + ISP_{ikm} + KSPI_{jkm/i} \\ & + TPKSI_{lm/jk/i}, \end{aligned}$$

where "/" in a subscript denotes that a term is nested within the variable, or variables, whose subscript follows. It can be seen that the three levels of I constituted a between K variable, K was a nested variable, S was a within school variable, and P was a repeated measure on participating teachers (T_{ijklm}) obtained by calculating an unweighted arithmetic average of a given performance measure over three-week intervals. A basic $ISKP_{ijklm}$ treatment combination (cell), therefore, contained five teachers, resulting in a total of 540 observations. Both K and T were treated as random variables in the analyses. A graphic representation of the general design is given in Figure 2.

The analyses of variance performed on data was accomplished with the assistance of a computer program entitled ANOVAR developed by the Brigham Young University Computer Research Center and modified for use on the IBM Model 6040 used by the University of Tennessee.

Instructional Treatments (I_i)	Schools ($K_{j/i}$)	Subject Matter Taught (S_k)					
		S_1 Periods (Pm)			S_2 Periods (Pm)		
		P_1	P_2	P_6	P_1	P_2	P_6
I_1	A	X_{11111} ⋮ X_{11151}					X_{11216} ⋮ X_{11256}
	B						
	C						
.	.						
.	.						
.	.						
I_3	G						
	H						
	I						

Figure 2. General experimental design

Dependent Variables

A re-examination of the research questions presented in the introduction of this report reveals that three types of behavioral change were of concern in this investigation. Essentially, two of the three types of change concerned teacher behavior. Specifically, as a function of the instructional treatment, possible resultant changes in (a) teachers' knowledge of interaction analysis (i.e., content mastery) and in (b) teachers' verbal behavior in the direction of greater indirect influence as a function of interaction-analysis instruction are implied by questions 1 and 2. In addition, a third area of behavioral change was addressed by question 3 which asked whether there would be greater student involvement (an increase in student talk-initiation) as a result of the instructional treatment.

To determine if teachers learned the mechanics of interaction analysis, raw scores earned by teachers on the 43 item content examination were used as the criterion measure or dependent variable. To generate measures of teacher and student behavioral change, the category ratings of the approximately 1600 teacher tapes analyzed by the rating staff were converted into 10 x 10 matrices according to the Flanders' system.[10] A computer program, designed to operate on the IBM 6040 possessed by the University of Tennessee, accomplished the task of matrix construction. In addition, the computer printout contained eight descriptive indices associated with the matrices. Four indices served as dependent variables in the assessment of teacher behavioral change while the remaining four were used in connection with the examination of student behavioral change.

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[10] Since a rudimentary knowledge of the construction and interpretation of the interaction analysis matrix is necessary to an understanding of the dependent variables employed in this research, readers unfamiliar with these processes are referred to Amidon and Flanders (1967, pgs. 31-64) for a complete discussion.

Measures of teacher behavior. As previously noted, an increase in the degree to which participating teachers emitted indirect influence statements was established as the criterion of enhanced teacher flexibility (see page 12). The _ID ratio_ and the _revised ID ratio_, two standard indices in the Flanders' system, were chosen a priori as the principal performance measures reflecting the degree of teacher indirect influence. These measures are described below:

1. ID RATIO. This ratio consists of the number of indirect teacher statements (i.e., the sum of matrix-columns 1, 2, 3, & 4) to the number of direct teacher statements (i.e., the sum of matrix-columns 5, 6, & 7). If, for example, the ID ratio were computed as 1.50, it would indicate that for every three indirect statements emitted by a teacher there were two direct statements. In short, the ID ratio serves as an overall measure of indirect influence and to the extent that it deviates from zero, it reflects a greater degree of indirectness.

2. REVISED ID RATIO. This ratio is similar to the ID ratio but omits both matrix-column 4 and 5 from the calculation. That is, the revised ID ratio is given by the sum of columns 1, 2, and 3 divided by the sum of columns 6 and 7. Since this performance measure is independent of questioning and lecture (categories 4 and 5), the principal verbal vehicles of subject matter transmission, it indicates the degree to which indirect influence is used by the teacher to motivate students and maintain class control.

Two additional dependent variables, _percent indirect-teacher response_ and _percent extended-indirect influence_, were employed as collateral measures of teacher indirect influence. These measures are defined as follows:

1. PERCENT INDIRECT-TEACHER RESPONSE. This measure indicates the extent to which teachers respond to student statements in an indirect manner (i.e., with teacher statements 1, 2, or 3) as opposed to direct responses (i.e., teacher statements 6 or 7). Percent indirect-teacher response is given by the sum of matrix-cells 8-1, 8-2, 8-3, 9-1, 9-2, and 9-3 divided by the sum of

cells 8-1, 8-2, 8-3, 9-1, 9-2, 9-3, 8-6, 8-7, 9-6 and 9-7; which in turn is multiplied by 100 to yield the percentage of total teacher response which is indirect.

2. PERCENT EXTENDED-INDIRECT INFLUENCE. Extended indirect influence refers to the degree to which a teacher engages in continuous unbroken, indirect influence exclusive of teacher questions. The percentage of total talk (i.e., the matrix total) that is extended-indirect influence can be calculated by summing over cells 1-1, 1-2, 1-3, 2-1, 2-2, 2-3, 3-1, 3-2, and 3-3, dividing this total by the matrix total and multiplying the result by 100.

Measures of student involvement. Two principal and two secondary dependent variables were employed for the purpose of examining student classroom participation and involvement. The two measures of primary concern were (a) the _teacher-student-talk ratio_ and (b) _percent student-talk response_. Essentially, the former is a yardstick of the amount of student participation in a lesson irrespective of the nature of that participation. On the other hand, percent student-talk response relates directly to the nature of student involvement, as defined in the Introduction, and thus served as the most significant dependent variable in relation to the stated purposes of this study. A summary of these performance measures follows:

1. TEACHER-STUDENT-TALK RATIO. A ratio of the number of teacher-talk statements (i.e., the sum of columns 1 through 7) to the total number of student statements (i.e., the sum of columns 8 and 9) defined the teacher-student-talk ratio. The higher the ratio, the greater the teacher verbalization in relation to student participation. It can be seen that this ratio is independent of column 10 ratings. This ratio not only provides an excellent gauge of student participation but also obliquely provides information concerning the nature of student involvement.

2. STUDENT-TALK-RESPONSE RATIO. A measure that reflects the extent to which student participation is a direct response to teacher inquiry, as opposed to student initiated communication, is provided by the student-talk response ratio. Recall that in the Flanders' System, student talk is classified as being either a direct response to stimuli presented by the teacher (category 8) or talk which is initiated by students (category 9). Essentially, the student-talk-response ratio is determined by dividing the number of category 8 statements by the sum of category 8 and 9 statements. Note that there is an inverse relationship between

> the magnitude of the ratio and the relative degree to which students express their own ideas, offer spontaneous contributions, and formally discuss ideas with other students. Since student participation which is characterized by student talk-initiation is indicative of a more intense and qualitatively superior form of student involvement, a position which is supported by an abundance of pedagogical theory, a diminution in the student-talk-response ratio as a function of the instructional treatments was interpreted as suggesting "greater student involvement in the instructional process."

A decision was reached to examine also percent teacher talk and percent student talk within the context of the general design. The former is furnished by dividing the matrix sum into the number of teacher statements and multiplying the quotient by 100; the latter by dividing the matrix sum into the total number of student statements and similarly multiplying by 100. Although it was realized that these two dependent variables were not as direct and meaningful as either the teacher-student-talk ratio or percent student-talk response, it was felt that these secondary performance measures would assist in the interpretation of observed student behavioral change.

In summary, teacher performance on the content examination served as the criterion for the question posed in the Introduction relating to content mastery of interaction analysis. In addition, for each of the approximately 1600 analyzed lesson episodes, a 10 x 10 interaction analysis matrix, with supporting indices, was generated by the computer. Eight of the interaction analysis indices were used as dependent variables in this research in an attempt to answer questions 2, 3 and 4.

It was realized that any evaluation of classroom behavior patterns utilizing the forestated performance measures should take into consideration the context and objectives of particular lessons. A teacher could, for example, be characteristically indirect in her relationship to students yet there might be instances when this teacher departs from an indirect posture because such a posture is less amenable to her instructional goals. It was for these reasons that for each teacher, one tape out of three was randomly selected each week for analysis; and every three weeks the performance measures were averaged to provide the basic datum for analysis. It was felt that these sampling and computational procedures would yield data that was both representative of a given teacher's classroom style and stable since the influence of idiosyncratic lessons was attenuated by the averaging process.

RESULTS

This chapter has as its purpose the presentation and analysis of data obtained in the field experiment. The data and analyses that follow are organized into four sections: (a) content mastery, (b) teacher behavioral change, (c) student participation and involvement and (d) teacher questionnaire results. The first three sections address themselves respectively to research questions 1, 2, and 3. Results that bear on the question of the differential effectiveness of the two inservice programs, that is question 4, are incorporated, where appropriate, within the above mentioned sections dealing with content mastery and behavioral change. In addition, less substantive data and information obtained from postexperimental teacher questionnaires are discussed in the last section.

Content Mastery

Scores earned on the 43 item content examination by the participating teachers in the six schools receiving an instructional treatment constituted the dependent variable used to ascertain the degree to which knowledge of interaction analysis was acquired. A post facto assessment of the instrument's reliability was made by utilizing the split-half (odd-even) internal consistency approach. A (consistency) coefficient of .94 was found using the Spearman Brown Prophecy formula. The reliability of the instrument appeared more than satisfactory. (In fact, in view of the modest length of the examination, the high degree of test reliability suggested by the analysis is most remarkable.)

Table 2 displays mean content examination scores and associated standard deviations for teachers instructing in mathematics and social studies within each of the six instructional-treatment schools. In addition, Table 2 also incorporates descriptive data resulting from the administration of the same examination to the group of 18 preservice teachers at the University of Tennessee. Postponing momentarily consideration of the latter group, detailed inspection of Table 2 disclosed that the most prominent effect (i.e., mean difference) was attributable to School A in relation to the other five schools. That is, the mean performance of School A teachers on the examination (12.3) appeared markedly "inferior" to that of the other schools. An analysis of variance of content exam scores by (a) instructional treatments (I), (b) schools (K) nested within I, and (c) subject matter taught (S) was performed to ascertain whether observed mean differences were greater than could be expected by chance. The results of the analysis is summarized by Table 3. At the .05 level, the level of significance established for this research, only the K term demonstrated significance ($\underline{F} = 10.17$; $\underline{df}.\ 4/48$; $\underline{p}. < .001$). Statistically, this finding was interpreted as indicating that at least one significant mean difference existed between a pair of schools independent of the influence of the I variable. In other words, if allowance is made for the influence of instructional treatments, there still remained a significant source of variability among the school means. To eliminate the confounding influence of the I variable, the effects of I_i were subtracted from respective school means. The procedure can be expressed mathematically by

$$\overline{K}_j(\text{adjusted}) = \overline{K}_{j/i} - (\overline{I}_i - \overline{I}.) \ .$$

Specific comparisons among adjusted schools means were made using the

Table 2

MEANS AND STANDARD DEVIATIONS OF CONTENT EXAMINATION SCORES[a]

	SIP-Only (n = 30)							SIP-Telelecture (n = 30)					
School	Math		SS		Total		School	Math		SS		Total	
	$\overline{x}$	s	$\overline{x}$	s	$\overline{x}$	s		$\overline{x}$	s	$\overline{x}$	s	$\overline{x}$	s
A	15.8	9.0	8.8	5.2	12.3[b]	7.8	D	32.8	1.1	32.4	4.2	32.6	2.9
B	28.8	8.8	28.6	5.9	28.7	7.0	E	34.4	4.8	32.0	6.4	33.2	5.5
C	29.8	7.9	26.4	10.9	28.1	9.2	F	30.8	7.2	26.8	3.2	28.8	5.6
Totals[c]	24.8	10.3	21.3	11.6	23.0	10.9		32.7	4.9	30.4	5.1	31.5	5.1

Preservice Teacher Sample (n = 18) : $\overline{x}$ = 38.6 ; s = 2.9

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[a] Rounded to the nearest tenth.

[b] Descriptive statistics based on the ten teachers within each school identified for study.

[c] The overall mean of inservice teachers was computed at 27.3.

TABLE 3

ANALYSIS OF VARIANCE OF CONTENT EXAMINATION SCORES BY INSTRUCTIONAL TREATMENTS, SCHOOLS, AND SUBJECT MATTER AREA

Source	df	ms	F
Between Schools	5		
I	1	1083.750	2.35
K/I[a]	4	460.933	10.17***
Within Schools	54		
S	1	126.150	6.81
I x S	1	6.017	.33
K x S/I	4	18.533	.41
T/K x S/I	48	45.342	
Total	59	90.003	

[a] The slash mark "/" denotes that the previous variable is nested within the variable following the mark.

***$p < .001$

Newman-Keuls method as described in Winer (1952, pp. 80-85).[1] As suspected, the mean performance of teachers in School A was shown to have been less than that of all other schools.[2] Differences among schools other than School A were not detected. In short, content examination data when subjected to the analysis of variance failed to demonstrate the superiority of one type of inservice program over the other relative to teacher achievement. The only significant difference noted pertained to an individual school where unspecifiable factors peculiar to that school were apparently in operation

Unfortunately, normative data for the content examination was not available. Meaningful comparisons leading to an interpretation of the degree to which teachers learned interaction analysis were, therefore, unobtainable. However, as mentioned in the section on procedures, the content examination was also given to a senior class of 18 students, 16 females and two males, in teacher training. As revealed by Table 2, the mean performance of the preservice student group was 38.6 as compared to the overall inservice mean of 27.3. The performance of the preservice group was most respectful considering that the maximal obtainable group mean on the examination was 43. To document further the apparent superior performance of the preservice group, a quasi-experimental _t_ test comparison between inservice teachers (n = 60) and preservice teachers (n = 18) was conducted. The resultant _t_ statistic of 8.01 was significant well beyond the .05 level. In summary, although lack of sufficient normative data relative to the content examination prevented a meaningful assessment of instructional treatment effectiveness, it was shown that inservice teachers receiving either the SIP-Only or the SIP-Telelecture failed to demonstrate that they had achieved the same degree of interaction analysis knowledge and skill as possessed by the sample of preservice teachers.

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[1] The Newman-Keuls approach employs the contrast as the base for alpha error and thus is one of the most sensitive, or least conservative, multiple comparison tests. The exploratory nature of this investigation combined with the septic nature of the field in which it was conducted prompted a decision to employ this method despite the fact that it leads to more alpha errors than would be expected from other conventional tests.

[2] Methodologically, it is most interesting to note that if the analysis of content exam data had not included an examination of variance due to individual schools, a spurious conclusion would have invariably resulted. Specifically, a 2 x 2 analysis was performed on the data in question which ignored the K variable. The three schools within each of the two levels of I were pooled to comprise one variable while S constituted the second variable. A significant F ($F = 14.82$; *df*. 1/56; $p < .001$) associated with the I term resulted indicating that the SIP-Telelecture mean exceeded the mean of the SIP-Only group. Further examination of these data in combination with the analysis described in the text above, however, revealed that the apparent difference between the instructional treatments was not due to an overall treatment effect but rather was caused by the relatively poor performance of only one school, School A, receiving the SIP-Only treatment.

Teacher Behavioral Change

Treatment combinations means of both ID ratios and revised ID ratios, the two principal dependent variables with respect to ascertaining teacher indirectness, are presented in Tables 4 and 5 respectively.[3] The analysis

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[3] As noted earlier, School C data for the three-week postinstructional period was missing. Because of the inability to faithfully analyze nested designs with missing cell data, several traditional methods of estimating missing data, including linear regression and substituting zeros for the missing values, were contemplated. A careful examination of plotted School C data, however, disclosed a complete absence of discernable trends over periods. Consequently, a decision was reached to estimate School C's postinstructional performance by extrapolating values observed in P_5. That is, for each behavioral performance measure reported in this study, P_5 data obtained by School C also served as data for P_6.

Table 4

ID RATIO MEANS FOR SIGNIFICANT TREATMENT COMBINATIONS[a]

School	Subject Matter	Temporal Periods						Sub-totals
		P_1	P_2	P_3	P_4	P_5	P_6	
		Schools Receiving SIP-Only						
A	Math	1.85	1.49	1.03	1.21	1.21	1.10	1.01
	SS	.76	.71	.73	.79	.70	.52	
B	Math	1.66	1.91	2.72	1.80	1.43	2.41	1.88
	SS	2.30	2.41	2.04	1.35	1.19	1.35	
C	Math	1.81	1.49	1.49	1.45	1.49	1.49	1.18
	SS	1.20	1.16	.77	.69	.56	.56	
Sub-totals		1.60	1.53	1.46	1.22	1.10	1.24	1.36
		Schools Receiving SIP-Telelecture						
D	Math	1.79	5.51	1.86	1.45	.87	1.62	1.68
	SS	2.12	1.39	1.13	.93	.76	.70	
E	Math	1.60	.83	1.11	1.32	.87	1.18	1.28
	SS	1.82	1.51	1.20	1.48	1.28	1.11	
F	Math	1.32	1.18	1.19	1.03	.95	1.74	1.17
	SS	.90	1.18	1.21	.99	1.39	.97	
Sub-totals		1.59	1.94	1.28	1.20	1.02	1.22	1.38
		Schools Receiving Control Condition						
G	Math	1.31	1.67	1.23	1.19	1.15	1.04	1.04
	SS	1.32	1.17	.71	.58	.59	.58	
H	Math	1.41	.86	1.47	2.88	.93	.96	1.37
	SS	2.56	1.85	1.03	.83	.57	1.12	
I	Math	1.57	1.51	1.01	1.03	1.00	.82	1.33
	SS	2.17	.87	1.75	1.20	1.86	1.13	
Sub-totals		1.72	1.32	1.20	1.29	1.02	.94	1.25
Totals		1.64	1.59	1.32	1.24	1.05	1.13	1.33

[a] Rounded to the nearest hundredth.

Table 5

REVISED ID RATIO MEANS FOR SIGNIFICANT TREATMENT COMBINATIONS[a]

School	Subject Matter	Temporal Periods P_1	P_2	P_3	P_4	P_5	P_6	Sub-totals
				Schools Receiving SIP-Only				
A	Math	6.81	24.56	5.69	7.79	3.91	2.38	9.16
	SS	8.91	10.65	13.18	6.41	10.64	9.00	
B	Math	8.99	6.70	6.25	6.37	6.39	6.39	9.97
	SS	15.22	12.39	12.93	8.03	19.96	9.99	
C	Math	4.35	5.20	2.71	2.74	2.39	18.39	7.42
	SS	4.50	6.62	6.95	14.58	10.28	10.28	
Sub-totals		8.10	11.02	7.95	7.65	8.93	9.40	8.85
				Schools Receiving SIP-Telelecture				
D	Math	2.60	2.89	5.09	3.73	2.36	2.56	5.23
	SS	10.04	10.30	4.25	6.21	8.55	4.14	
E	Math	4.83	5.03	3.31	11.06	3.56	2.62	8.80
	SS	12.10	23.76	14.61	13.12	6.04	5.51	
F	Math	3.20	6.40	2.83	1.97	2.03	3.15	7.73
	SS	9.62	13.22	16.76	11.88	14.08	7.65	
Sub-totals		7.06	10.27	7.81	7.99	6.10	4.27	7.25
				Schools Receiving Control Condition				
G	Math	1.94	3.33	3.00	2.54	3.95	1.60	6.97
	SS	16.31	11.86	8.51	9.43	6.66	14.52	
H	Math	5.01	2.07	2.74	5.25	3.22	3.31	5.09
	SS	6.29	12.67	6.14	5.21	3.29	5.84	
I	Math	4.87	2.98	1.44	1.72	1.84	0.90	4.03
	SS	8.66	4.53	4.87	4.70	9.10	2.72	
Sub-totals		7.18	6.24	4.45	4.81	4.68	4.81	5.36
Totals		7.46	9.18	6.74	6.82	6.57	6.16	7.15

[a] Rounded to the nearest hundredth.

of variance of instructional treatments by schools, by subject matter, and by temporal periods for each dependent variable is summarized in Table 6. Relative to the analysis of ID ratios, an examination of Table 6 revealed that the sources of variance that might suggest a significant effect due to the instructional variable (i.e., either IP or ISP) were clearly nonsignificant.[4] Moreover, the only observed significant *F* (*F* = 3.51, *df*. 5/30, *p*. $<$.025) was associated with the period (P) main effect. Newman-Keuls comparisons among the six temporal period means, conducted at the .05 level, revealed that the mean ID ratio obtained for Period 1 (1.64) exceeded both the Period 5 (1.05) and Period 6 (1.13) means. Also, the Period 2 mean (1.59) was found to be significantly greater than the mean for Period 5. Because of the importance of the ID ratio as a performance measure in this study, a graphic illustration of ID ratio means for each instructional group over temporal periods is shown in Figure 3. Examination of Figure 3 confirms the erosion in magnitude of teacher indirect influence from the preinstructional phase (P_1) to the postinstructional period (P_6).

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[4] The reader who is relatively unfamiliar with complex designs should be informed that with respect to the analyses which follow, the IP and ISP terms have greatest relevance to significant effects attributable to inservice instruction. If as a result of either I_1 of I_2, or both, there is a significant change in behavior relative to I_3 (the control group) change will be reflected in a significant *F* ratio for the interaction of I and P. That is, a divergence between the performance means of I_1 or I_2 and I_3 would be expected over levels of P since, as a result of instruction in interaction analysis, the behavior of teachers in the inservice group(s) would become less similar to that of the control group as the experiment progressed. Similarly, if instruction in interaction analysis was responsible for change in the behavior of only teachers in a given subject matter classification (S_k), relative to the control condition, a significant *F* ratio for ISP would result.

Table 6

ANALYSIS OF VARIANCE OF ID RATIOS AND REVISED ID RATIOS BY INSTRUCTIONAL TREATMENTS, SCHOOL, SUBJECT MATTER AND TEMPORAL PERIODS

		ID Ratios		Revised ID Ratios	
Source	df.	ms	F	ms	F
Between Teachers	89				
Between Schools	8				
I	2	.853	.14	548.325	3.76
K/I^a	6	6.299	.98	145.672	1.35
Within Schools	81				
S	1	11.423	3.56	3494.453	31.78**
I x S	2	2.272	.71	125.824	1.14
K x S/I	6	3.210	.50	109.975	1.02
T/K x S/I	72	6.409		107.725	
Within Teachers	450				
P	5	5.275	3.51*	104.213	1.38
I x P	10	0.750	.50	49.735	.66
K x P/I	30	1.504	1.31	75.615	1.28
S x P	5	1.314	.89	36.875	.55
I x S x P	10	1.223	.83	82.165	1.24
K x S x P/I	30	1.474	1.28	66.197	1.12
T x P/K x S/I	360	1.153		59.150	
Total	539	2.027		77.375	

[a] Schools treated as a random variable in the analysis.

*p.<.05

**p.<.01

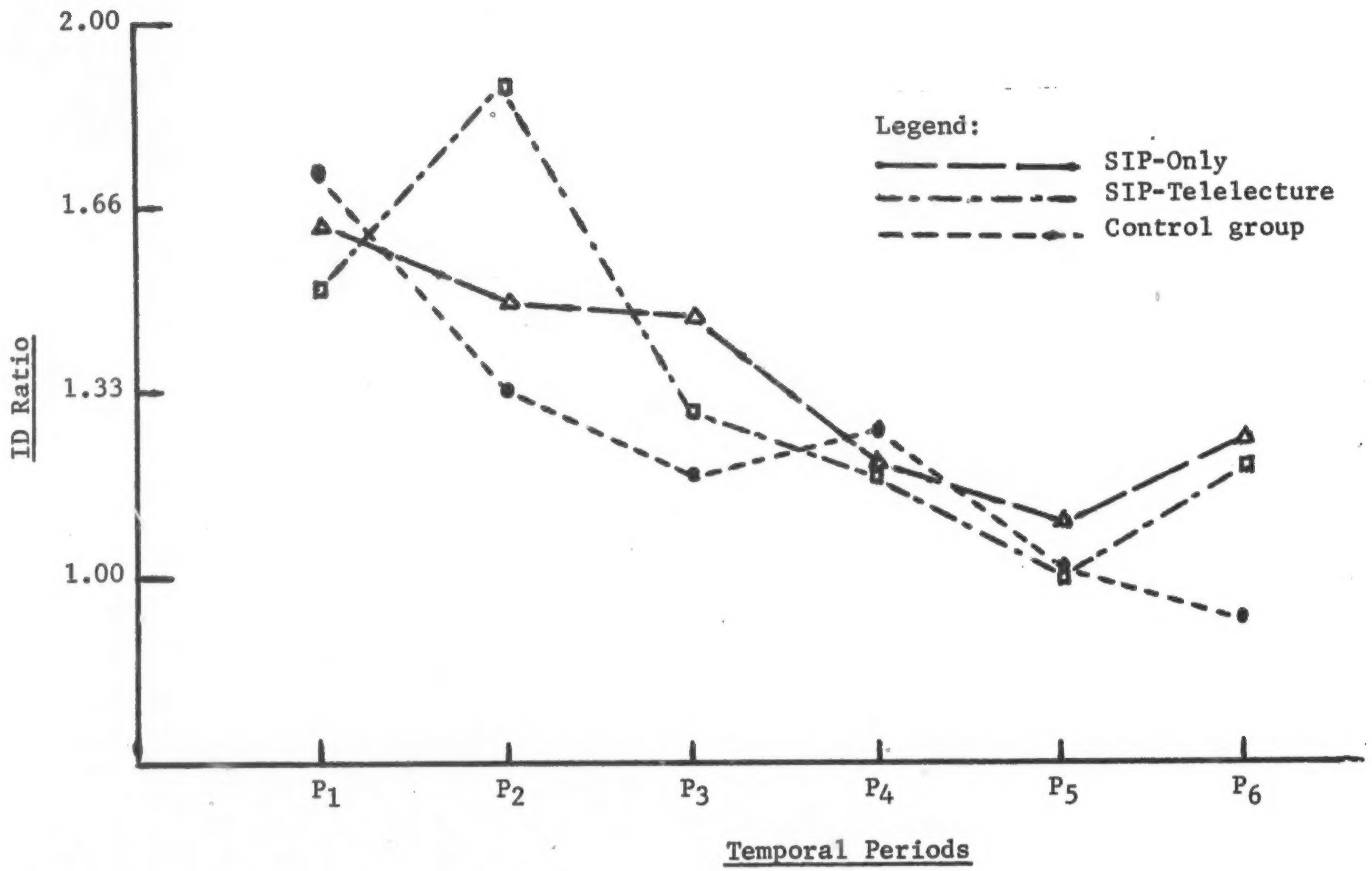

Figure 3. ID ratios of instructional treatment groups over temporal periods.

Also contained in Table 6 are the results of the analysis of variance performed on revised ID ratios. Only the subject main effect (S) achieved significance ($\underline{F} = 31.78$; df. 1/6; $\underline{p}. < .005$) although the main effect for instructional treatments ($\underline{F} = 3.76$; df. 2/6; $\underline{p}. < .10$) approached, but did not achieve, the level of significance established for this research. Concerning the former, the overall revised ID ratio mean observed for teachers instructing in the area of social studies (9.70) was found to be of greater magnitude than that of teachers presenting lessons in mathematics (4.61). This finding, although unrelated to the influence of the instructional treatments, suggests that elementary teachers exhibit greater indirect influence in their attempts to structure class control when they are instructing in the social studies as contrasted to instructing in mathematics.

Table 7 contains the obtained means of percent indirect-teacher response measures. The analysis of variance reported in Table 9 indicated that the overall effect of the subject matter taught variable was significant ($\underline{F} = 18.61$; df. 1/6; $\underline{p}. < .006$). Reference to mean indirect-teacher response measures in Table 7 revealed that the social studies teachers in this study were found on the average to respond to student statements, categories 8 and 9, with indirect statements over 94 percent of the time; mathematics teachers, however, responded to student statements with indirect influence at the significantly lower rate of 88.8 percent.

Presented in Table 8 are percent extended-indirect influence means for significant treatment combinations. The analysis of these data, summarized in Table 9, produced three significant $\underline{F}$ ratios. The significant effect attributable to instructional treatments ($\underline{F} = 12.32$; df.2/6; $\underline{p}. < .001$) presented no problem in interpretation. To determine the origin

Table 7

PERCENT INDIRECT-TEACHER RESPONSE MEANS FOR SIGNIFICANT TREATMENT COMBINATIONS[a]

School	Subject Matter	Temporal Periods P_1	P_2	P_3	P_4	P_5	P_6	Sub-totals
				Schools Receiving SIP-Only				
A	Math	90.43	94.39	94.21	95.29	94.48	93.98	93.00
	SS	87.75	86.54	93.13	95.12	98.96	91.76	
B	Math	87.82	90.32	92.91	94.97	92.07	87.32	92.51
	SS	96.46	95.17	94.73	97.47	83.70	97.13	
C	Math	89.20	88.43	89.23	87.02	88.40	88.40	92.23
	SS	92.17	97.92	96.22	97.99	95.88	95.88	
Sub-totals		90.64	92.13	93.40	94.64	92.25	92.41	92.58
				Schools Receiving SIP-Telelecture				
D	Math	86.18	89.65	93.39	90.74	74.46	67.62	88.59
	SS	96.26	91.75	94.18	91.88	95.16	91.85	
E	Math	94.41	92.09	93.46	95.63	88.27	90.62	94.97
	SS	96.18	98.86	98.62	97.08	97.87	96.54	
F	Math	84.80	87.05	89.82	88.67	86.20	91.82	92.69
	SS	92.72	97.43	98.77	98.27	99.17	97.58	
Sub-totals		91.76	92.81	94.71	93.71	90.19	89.34	92.09
				Schools Receiving Control Condition				
G	Math	86.59	90.68	90.82	90.33	93.45	86.93	90.40
	SS	92.71	92.97	87.17	91.93	90.41	90.83	
H	Math	88.12	88.09	85.95	86.63	86.00	94.64	90.35
	SS	93.21	95.51	93.62	89.68	90.15	92.53	
I	Math	89.19	87.04	83.38	84.47	83.83	75.78	87.99
	SS	94.28	93.12	92.32	89.25	96.44	86.79	
Sub-totals		90.69	91.24	88.88	88.71	90.05	87.92	89.58
Totals		91.03	92.06	92.33	92.36	90.83	89.89	91.42

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[a] Rounded to the nearest hundredth.

Table 8

PERCENT EXTENDED-INDIRECT INFLUENCE MEANS FOR
SIGNIFICANT TREATMENT COMBINATIONS[a]

School	Subject Matter	Temporal Periods						Sub-totals
		P_1	P_2	P_3	P_4	P_5	P_6	
Schools Receiving SIP-Only								
A	Math	3.63	3.56	2.71	3.64	4.15	3.42	2.56
	SS	1.59	1.86	1.89	1.50	1.69	1.03	
B	Math	2.07	2.24	1.77	2.23	1.96	2.77	2.94
	SS	4.28	4.27	4.86	3.02	3.00	2.76	
C	Math	2.46	1.63	2.19	2.03	2.85	2.85	2.73
	SS	3.62	3.13	3.49	2.97	2.77	2.77	
Sub-totals		2.94	2.78	2.82	2.57	2.74	2.60	2.74
Schools Receiving SIP-Telelecture								
D	Math	2.89	1.65	3.98	2.90	2.71	3.42	2.71
	SS	2.91	3.17	2.36	1.90	2.49	2.17	
E	Math	4.57	2.41	2.54	3.30	2.60	3.27	3.60
	SS	4.77	3.62	3.73	5.23	3.44	3.77	
F	Math	2.74	2.72	3.12	2.57	2.93	3.70	3.16
	SS	3.86	3.30	3.63	2.98	3.39	2.98	
Sub-totals		3.62	2.81	3.23	3.45	2.93	3.22	3.16
Schools Receiving Control Condition								
G	Math	1.44	2.08	2.16	1.77	1.39	1.88	2.05
	SS	2.69	3.36	2.05	1.84	1.61	2.35	
H	Math	2.06	2.00	2.52	1.38	2.09	2.25	2.09
	SS	2.58	1.71	2.51	2.08	1.23	2.66	
I	Math	1.43	2.22	1.26	2.58	1.84	1.16	1.93
	SS	2.85	2.79	2.32	1.16	2.00	1.59	
Sub-totals		2.18	2.36	2.14	1.80	1.69	1.98	2.02
Totals		2.91	2.65	2.73	2.51	2.45	2.60	2.64

[a] Rounded to the nearest hundredth.

Table 9

ANALYSIS OF VARIANCE OF PERCENT INDIRECT-TEACHER RESPONSE AND PERCENT EXTENDED-INDIRECT INFLUENCE BY INSTRUCTIONAL TREATMENTS, SCHOOL, SUBJECT MATTER AND TEMPORAL PERIODS

		Percent Indirect-Teacher Response		Percent Extended-Indirect Influence	
Source	df.	ms	F	ms	F
Between Teachers	89				
Between Schools	8				
I	2	471.635	1.89	59.271	12.32**
K/I[a]	6	249.705	.95	4.811	.71
Within Schools	81				
S	1	3676.697	18.61**	8.917	.46
I x S	2	293.870	1.49	.546	.03
K x S/I	6	197.604	.75	19.227	2.83*
T/K x S/I	72	263.247		6.794	
Within Teachers	450				
P	5	91.393	1.15	2.473	1.72
I x P	10	69.887	.88	1.182	.82
K x P/I	30	79.455	1.10	1.442	.99
S x P	5	40.990	.59	4.225	3.88**
I x S x P	10	54.416	.78	1.900	1.75
K x S x P/I	30	70.121	.96	1.088	.75
T x P/K x S/I	360	72.487		1.454	
Total	539	110.079		2.645	

[a] Schools treated as a random variable in the analysis.

*$p. < .05$

**$p. < .01$

2

of the effect, Newman-Keuls procedures were employed on the I_i means. It was found that the overall control group mean (2.02) was significantly less than the means of both the SIP-Only (2.74) and SIP-Telelecture (3.15) groups at .05. (This finding, however, bears little relevance to the efficacy of the inservice courses as change agents since evidence was not provided indicating differential simple effects among I_i groups as a function of time in the experiment.)

The significant KS/I term (F = 2.83; df. 6/72; $p. < .05$) which appeared in the analysis of percent extended-indirect influence data was an indication that a significant first order interaction between subject matter taught and schools existed after the effects of instructional treatments have been considered. To examine the nature of the K x S interaction, it was necessary to adjust the KS_{jk} cell means for the respective effects of I_i.[5] Adjusted subject matter means at each of the nine levels of the school variable were subjected to a Newman-Keuls comparison. Results indicated that, at the .05 level of significance, mathematics teachers in School A (3.42) demonstrated greater extended indirect influence than social studies teacher (1.50) in School A. The reverse situation was found with respect to School B, i.e., $3.60 > 2.08$. Significance was confined to only the two aforementioned schools both of which received the SIP-Only treatment. However, it should be emphasized again that the detected KS/I effects were not significantly related to the influence of the inservice programs.

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[5] The adjustment of KS_{jk} means for the effects of I_i was accomplished by substracting the effect of each respective instructional group from the KS cell means. This procedure can be expressed statistically by

$$\overline{KI}_{jk} \text{ (adj. for } I_i) = \overline{KI}_{jk} - (\overline{I}_i - \overline{I}.) \ .$$

The variability among resulting values for KS cell means can be interpreted as the "pure" variability among KS means no longer confounded by the influence of instructional treatments.

The third significant F ratio observed in the analysis of percent extended-indirect influence measures was that associated with the interaction of Schools x Periods ($F = 3.88$; df.5/30; $p. < .01$). Newman-Keuls comparisons, at the .05 level, applied to subject matter means at each level of the temporal periods variable showed that teachers instructing in the social studies were behaving in a more extended indirect manner during Periods 1 through 3 (the first nine weeks of the experiment). However, at a point during Period 4, as an examination of SP means in Table 7 disclosed, the mean performance of social studies teachers decreased to approximately the same level as mathematics teachers (i.e., 2.50) and this "lower" level of extended indirect influence was maintained by both instructional groups throughout the remaining nine weeks (Periods 4 through 6) of the study. A clearer picture of this finding resulted after an a posteriori contrast, employing Scheffe's method to derive the appropriate critical test value, was performed between the means of math (2.45) and social studies teachers (3.08) computed over the initial three periods. A significant result was achieved ($F = 24.78 > 11.30$; $p. < .001$) which indicated that during the first half of the experiment (weeks 1 through 9), teachers taping social studies lessons were emitting a higher percentage of extended indirect influence behavior.

In summary, the combined results of the analysis of the two principal and two secondary dependent variables failed to provide evidence suggesting that the inservice instruction in interaction analysis was effective relative to promoting classroom-behavioral change in teachers. In fact, the trend in ID ratios observed in both the SIP-Only and SIP-Telelecture groups toward greater direct teaching behavior as the experiment progressed might prompt the conclusion, albeit erroneous, that the inservice instruction was responsible for the decline in indirect influence. Such an interpretation is invalid, however, since the control group, which did not receive inservice instruction, also manifested the declining trend in magnitude of mean ID ratios over time. (Parenthetically, a discussion of the significant negative ID ratio trend is presented in the discussion section.) Moreover, since evidence supporting the effectiveness of any one of the instructional treatments did not materialize, no valid conclusions can be drawn relative to the differential effectiveness of instructional treatments.

The study of data pertaining to teacher change did produce several interesting, although peripheral, significant effects. Elementary teachers, for example, were shown to have assumed a more indirect teaching style when offering instruction in the social studies as compared to instruction in mathematics. This finding was supported by empirical evidence which indicated that the social studies teachers possessed a higher mean revised ID ratio and responded to student comments with a greater indirect influence. Moreover, social studies teachers were shown to have engaged in a greater percentage of extended indirect influence during the first half of the experiment. Although such a finding would be no surprise to the elementary educator, it does suggest to the researchers that subject matter is a highly relevant variable and must be considered in future studies utilizing interaction analysis.

Student Participation and Involvement

Teacher-student-talk ratio data reflect the degree to which teachers "monopolize" verbal interaction in the classroom. Teacher-student-talk ratio means are contained in Table 10. The analysis of teacher-student-

Table 10

TEACHER-STUDENT-TALK RATIO MEANS FOR SIGNIFICANT TREATMENT COMBINATIONS[a]

School	Subject Matter	Temporal Periods P_1	P_2	P_3	P_4	P_5	P_6	Sub-totals
Schools Receiving SIP-Only								
A	Math	4.03	5.00	3.55	6.20	4.66	3.79	7.56
	SS	4.47	30.53	6.33	7.35	10.98	3.88	
B	Math	2.62	2.30	2.56	2.88	2.41	3.16	2.30
	SS	2.11	2.06	2.15	1.79	1.81	1.69	
C	Math	2.67	3.81	3.39	3.26	3.65	3.65	4.56
	SS	3.26	7.14	5.41	6.93	5.76	5.76	
Sub-totals		3.19	8.47	3.90	4.73	4.88	3.66	4.81
Schools Receiving SIP-Telelecture								
D	Math	2.27	2.80	3.09	2.50	2.82	2.25	2.44
	SS	2.24	2.65	1.71	2.23	1.79	2.92	
E	Math	3.48	3.59	3.03	3.18	3.35	3.37	3.16
	SS	2.56	2.83	5.09	2.45	2.14	2.81	
F	Math	3.23	3.39	2.41	2.72	2.44	2.84	2.66
	SS	2.79	2.77	2.76	2.22	2.21	2.15	
Sub-totals		2.76	3.00	3.02	2.55	2.46	2.72	2.75
Schools Receiving Control Condition								
G	Math	1.89	2.64	2.94	2.45	2.44	3.66	2.62
	SS	2.24	3.11	2.24	2.59	2.48	2.73	
H	Math	2.49	3.69	2.24	2.40	2.99	2.97	2.90
	SS	4.26	2.34	2.70	3.57	2.48	2.60	
I	Math	2.16	1.70	1.54	1.66	1.60	1.78	2.12
	SS	1.73	3.01	2.29	3.02	2.68	2.12	
Sub-totals		2.46	2.75	2.33	2.62	2.45	2.64	2.54
Totals		2.81	4.74	3.08	3.30	3.26	3.01	3.37

[a] Rounded to the nearest hundredth.

talk data is presented in Table 12. An inspection of the summary table failed to reveal the presence of a significant effect at the .05 level. However, the K/I source of variation approached significance ($\underline{F}$ = 3.76; $\underline{df}$. 6/72; $\underline{p}$. $<$.10) An a posteriori inspection of specific effects showed that among schools receiving SIP-Only, a teacher-student-talk ratio mean of 7.56 for School A in contrast to that of 2.30 for School B was largely responsible for the undistinguished K/I effect.

The results of student-talk response ratio data constituted the most important phase of the student behavior analysis because this ratio was directly related to student involvement as defined in the Introduction. Recall that for this measure, the smaller the ratio, the greater the qualitative involvement of students. Student-talk response means for significant treatment combinations are contained in Table 11 and the results of the analysis of variance on student-talk response ratio means are included in a portion of Table 12. Inspection of Table 12 disclosed two significant effects. First, the K/I term just achieved significance ($\underline{F}$ = 2.31; $\underline{df}$. 6/72; $\underline{p}$. $<$.05). Differences among schools after adjustments have been made for the influence of the instructional treatments main effect are suggested by the significant $\underline{F}$ associated with K/I. Utilizing procedures similar to those previously described (see page 39), school means were corrected for the respective influence of I_i and Newman-Keuls comparisons were conducted. At the .05 level of significance, Newman Keuls procedures were unable to demonstrate a difference between any pair of school means. This situation did not constitute a complete surprise considering that the effect in question barely achieved significance at .05. ($\underline{F}$ = 2.31 $>$ 2.24). However, because of the exploratory nature of this investigation, more sensitive, but less appropriate, $\underline{t}$

Table 11

STUDENT-TALK-RESPONSE RATIO MEANS FOR SIGNIFICANT TREATMENT COMBINATIONS[a]

School	Subject Matter	Temporal Periods						Sub-totals
		P_1	P_2	P_3	P_4	P_5	P_6	
Schools Receiving SIP-Only								
A	Math	.95	.75	.85	.88	.92	.91	.84
	SS	.90	.81	.69	.84	.70	.83	
B	Math	.86	.79	.86	.82	.89	.88	.76
	SS	.58	.65	.58	.56	.91	.68	
C	Math	.91	.98	.94	.97	.95	.95	.90
	SS	.91	.82	.76	.81	.88	.88	
Sub-totals		.85	.80	.78	.81	.87	.85	.83
Schools Receiving SIP-Telelecture								
D	Math	.87	.82	.78	.82	.86	.87	.71
	SS	.70	.46	.58	.58	.60	.57	
E	Math	.88	.84	.88	.84	.87	.87	.78
	SS	.79	.69	.73	.63	.58	.76	
F	Math	.87	.95	.86	.86	.87	.92	.82
	SS	.80	.84	.73	.64	.72	.73	
Sub-totals		.81	.77	.76	.73	.75	.79	.77
Schools Receiving Control Condition								
G	Math	.94	.89	.87	.88	.84	.82	.77
	SS	.82	.68	.58	.78	.51	.60	
H	Math	.90	.92	.95	.92	.89	.84	.88
	SS	.82	.88	.83	.88	.83	.83	
I	Math	.90	.98	.93	.88	.95	.94	.85
	SS	.76	.81	.77	.81	.69	.79	
Sub-totals		.86	.86	.82	.86	.78	.80	.83
Totals		.84	.81	.79	.80	.80	.82	.81

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[a] Rounded to the nearest hundredth.

Table 12

ANALYSIS OF VARIANCE OF TEACHER-STUDENT-TALK AND STUDENT-TALK-RESPONSE RATIOS BY INSTRUCTIONAL TREATMENTS, SCHOOL, SUBJECT MATTER AND TEMPORAL PERIODS

		Teacher-Student-Talk Ratio		Student-Talk-Response Ratio	
Source	df.	ms	F	ms	F
Between Teachers	89				
Between Schools	8				
I	2	281.829	1.94	.239	1.07
K/I[a]	6	145.516	1.91	.223	2.31*
Within Schools	81				
S	1	90.791	1.55	3.163	48.63***
I x S	2	104.993	1.80	.045	.69
K x S/I	6	58.493	.77	.065	.67
T/K x S/I	72	76.162		.097	
Within Teachers	450				
P	5	43.807	1.50	.032	1.37
I x P	10	33.830	1.16	.035	1.51
K x P/I	30	29.250	.83	.023	1.35
S x P	5	29.237	1.11	.016	1.11
I x S x P	10	33.660	1.28	.020	1.42
K x S x P/I	30	26.378	.74	.014	.82
T x P/K x S/I	360	35.455		.017	
Total	539	42.754		.038	

[a] Schools treated as a random variable in the analysis.

*$p. < .05$

***$p. < .001$

tests were performed at .05 between school means. School C was found to possess an adjusted student-talk response ratio mean (.88) of greater magnitude than Schools B (.74), D (.75), and G (.75). In addition, adjusted means for Schools F (.86) and H (.85) were found to exceed that of School B. The marginal nature of the overall F statistic and the necessity to resort to t test comparisons suggest that extreme caution be exercised in the interpretation of the above findings.

Table 12 also revealed a significant main effect for subject matter (F = 48.63; df. 1/6; $p. < .001$). Inspection of the overall means for the subject matter groups indicated that the social studies teachers (.73) managed to elicit from their students a higher rate of student-talk initiation than did mathematics teachers (.89). However, the analysis of student-talk response data failed to show that either of the inservice courses had any effect relative to the enhancement of student involvement.

Descriptive data for the percent teacher talk and percent student talk performance measures are presented in Table 13 and Table 14 respectively. The analysis of variance performed on each of these collateral dependent variables is summarized by Table 15. The interaction of Instruction Treatments x Periods was observed (F = 2.21; df. 10/30; $p. < .05$) in the percent teacher talk data. Simple effects tests on instructional treatment means were performed at each level of the period variable and all tests were found to be significant. Specific comparisons among instructional treatment means were made using the Newman-Kuels method. It was found that the control group teachers demonstrated a consistently lower percent of teacher talk throughout the experiment (see footnote 6). Also for Period 1, teachers receiving the telelecture treatment produced a significantly greater percentage of teacher-talk (64.7%) than teachers in

Table 13

PERCENT TEACHER TALK MEANS FOR SIGNIFICANT TREATMENT COMBINATIONS

School	Subject Matter	Temporal Periods						Sub-totals
		P_1	P_2	P_3	P_4	P_5	P_6	
				Schools Receiving SIP-Only				
A	Math	63.96	66.42	67.19	64.73	65.65	61.91	64.63
	SS	60.92	60.07	66.86	62.43	69.05	66.40	
B	Math	61.08	58.13	61.95	64.19	62.94	65.28	59.26
	SS	57.57	59.36	60.05	51.70	55.63	53.22	
C	Math	62.20	60.78	61.43	60.87	65.27	65.27	67.32
	SS	63.68	73.48	73.34	73.96	73.76	73.76	
Sub-totals		61.57	63.04	65.14	62.98	65.36	64.31	63.74
				Schools Receiving SIP-Telelecture				
D	Math	63.63	59.46	63.22	60.60	58.97	42.24	59.16
	SS	60.76	56.88	56.76	60.61	60.06	66.73	
E	Math	70.17	70.40	66.02	68.91	67.08	68.52	67.70
	SS	67.47	68.36	68.49	65.48	62.77	68.69	
F	Math	61.69	59.63	59.67	61.42	61.54	61.68	62.40
	SS	64.47	64.75	64.89	63.45	63.77	61.79	
Sub-totals		64.70	63.25	63.18	63.41	62.36	61.61	63.08
				Schools Receiving Control Condition				
G	Math	52.82	60.19	60.49	58.17	60.60	57.09	58.07
	SS	58.12	61.37	51.71	59.63	56.11	60.56	
H	Math	61.74	63.73	54.86	60.49	61.24	66.28	59.44
	SS	57.23	56.52	60.97	57.54	56.83	55.90	
I	Math	55.22	53.63	47.06	48.28	50.32	50.06	52.65
	SS	54.46	60.70	55.06	53.51	55.89	47.61	
Sub-totals		56.60	59.36	55.03	56.27	56.83	56.25	56.72
Totals		60.95	61.88	61.11	60.89	61.53	60.72	61.18

[a] Rounded to the nearest hundredth.

Table 14

PERCENT STUDENT TALK MEANS FOR SIGNIFICANT TREATMENT COMBINATIONS[a]

School	Subject Matter	Temporal Periods						Sub-totals
		P_1	P_2	P_3	P_4	P_5	P_6	
		Schools Receiving SIP-Only						
A	Math	26.24	24.33	23.24	24.78	23.75	29.82	27.70
	SS	34.48	34.90	28.91	31.69	23.75	26.45	
B	Math	30.50	30.71	28.19	27.82	31.55	25.62	33.73
	SS	38.39	35.65	34.70	44.65	39.33	37.59	
C	Math	26.83	25.32	23.55	26.24	22.94	22.94	22.99
	SS	30.57	19.92	21.91	18.91	18.40	18.40	
Sub-totals		31.17	28.47	26.75	29.02	26.62	26.80	28.14
		Schools Receiving SIP-Telelecture						
D	Math	30.14	28.35	25.45	26.13	21.03	27.40	29.66
	SS	34.08	33.72	35.51	31.89	35.39	26.72	
E	Math	22.59	21.84	24.64	22.95	22.25	22.69	26.22
	SS	29.28	27.51	28.33	31.74	34.07	26.76	
F	Math	29.13	26.80	28.52	24.70	25.34	23.72	29.02
	SS	30.62	29.21	31.00	33.13	32.46	33.66	
Sub-totals		29.31	27.90	28.91	28.42	28.42	26.84	28.30
		Schools Receiving Control Condition						
G	Math	33.60	25.72	26.44	26.04	26.57	21.30	30.87
	SS	37.65	32.90	39.68	32.52	37.89	30.20	
H	Math	27.05	20.25	29.69	29.26	22.60	23.70	29.30
	SS	30.49	32.98	32.11	31.88	35.86	35.73	
I	Math	29.91	34.61	35.57	33.52	34.67	31.03	34.02
	SS	39.17	31.68	31.38	35.85	30.75	40.07	
Sub-totals		32.98	29.69	32.48	31.51	31.39	30.34	31.40
Totals		31.15	28.69	29.38	29.65	28.81	27.99	29.28

[a] Rounded to the nearest hundreth.

Table 15

ANALYSIS OF VARIANCE OF PERCENT TEACHER TALK AND PERCENT STUDENT TALK BY INSTRUCTIONAL TREATMENTS, SCHOOL, SUBJECT MATTER AND TEMPORAL PERIODS

		Percent Teacher Talk		Percent Student Talk	
Source	df.	ms	F	ms	F
Between Teachers	89				
Between Schools	8				
I	2	2705.232	2.80	607.669	.80
K/I[a]	6	966.468	1.72	761.020	1.52
Within Schools	81				
S	1	60.876	.15	3703.917	13.30*
I x S	2	19.338	.05	94.175	.34
K x S/I	6	408.589	.73	278.426	.56
T/K x S/I	72	561.983		501.545	
Within Teachers	450				
P	5	18.227	.57	105.840	2.68*
I x P	10	70.329	2.21*	29.499	.75
K x P/I	30	31.791	.55	39.464	.76
S x P	5	25.450	.27	13.149	.23
I x S x P	10	58.185	.63	59.547	1.03
K x S x P/I	30	93.133	1.61	58.105	1.11
T x P/K x S/I	360	57.738		52.208	
Total	539	148.905		131.099	

[a] Schools treated as a random variable in the analysis.

*$p < .05$

the SIP-Only groups (61.6%). As the experiment progressed, however, there was a noticeable reversal of effect which became most pronounced in Period 5 where SIP-Telelecture teachers had a significantly lower percent teacher talk mean (62.4%) than the SIP-Only group (65.4%). These findings might be used to suggest that the SIP-Telelecture treatment was responsible for a reduction in the percent of teacher-talk during the course of the experiment. It should be pointed out, however, that such an interpretation is unjustified for several reasons. The fact that the control group demonstrated significantly lower percent teacher talk means at all levels of P combined with the fact that the three instructional groups were shown to have been unequal prior to instruction, greatly complicates any interpretation that can be made.[6] Newman-Kuels comparisons were made between the preinstructional and post instructional means for both the SIP-Only and SIP=Telelecture groups and significant differences at the .05 level failed to materialize. In short, despite the initial promise offered by the significant I x P effect, subsequent examinations resulted in findings that could not be used to reject a null hypothesis of no difference over time due to the instructional treatments.

The last major analysis was performed on percent student talk data. (See Table 14). Significant Fs for the subject matter main effect ($F = 13.30$; df. 5/30; $p. < .05$) and the temporal periods main effect ($F = 2.68$; df. 5/30; $p. < .05$) were detected (see Table 15). Relative to the former effect, social studies teachers in the experiment were shown to have elicited a higher mean percent (31.9%) of student participation than mathematics teachers (26.7%). A comparison of temporal period means using the Newman-Keuls suggested a pronounced downward trend in percent student-talk over the 18 experimental weeks with a secondary model condition observable during Periods 3 and 4, the midpoint of the experiment. Specifically, the mean of Period 1 (31.15) exceeded all subsequent period means. The Period 3 and Period 4 means (29.38 and 29.65) were found to exceed the means of Period 2 (28.69) and Period 5 (28.81). Further, Period 6 (27.99) was found to be less than all preceding periods relative to mean comparisons. All differences were observed at the .05 level of significance.

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[6] The pretreatment inequality of instructional groups observed in connection with the analysis of percent teacher talk data could be interpreted as an artifact of the assignment of schools to instructional treatment conditions, a manifestation of the proverbial "rare event" that is possible within the context of random assignment. However, the inability of these investigators to employ strict random procedures (see page 20) in the assignment of schools prompted the more plausible interpretation that the observed pretreatment differences were the result of a failure to equate instructional groups on all relevant variables using "quasi-random" procedures.

It is interesting to note that the trend of percent teacher-talk means when plotted over periods did not compliment the above findings as one might have expected. As can be observed in Table 13, the overall period means for percent teacher-talk were remarkably consistent. Therefore, the reduction in student talk which is not compensated for by an increase in teacher talk implies that category 10 (silence and/or confusion) responses increased over the experiment. In short, students appeared to have been occupied with greater amounts of "seatwork," group work, etc. during the lessons taped in the instructional phase as compared to the preinstructional phase, and similarly, during the post experimental phase as compared to the instructional phase.

In summary, the analysis of performance measures designed to assess student participation and involvement as a function of teacher inservice instruction in interaction analysis fail to provide evidence which demonstrated that the instructional treatments were responsible for changes in student behavior. It was found that elementary teachers instructing in the social studies, as compared to instruction in mathematics, obtained a greater degree of student-talk initiation statements from their students. However, this study was unable to detect evidence which could have been used to reject the null hypothesis implied by questions 2 and 4 in the Introduction, and it was to those ends that this portion of the research was directed.

Teacher Questionnaire Results

Aside from items designed to elicit biographical information, the questionnaire administered to participating teachers during the post instructional segment also contained questions relating to teacher reactions to the study. The teacher questionnaire is presented in Appendix D. It can be seen that the questionnaire items were largely of an "open ended" nature although on eight occasions teachers were requested to complete an item stem with either a "yes" or "no" response. Because of their relevance to the effectiveness of the inservice programs, at least as perceived by the participants, the results of five of the eight objective-type items are presented in Table 16. The most striking observation gleaned from a study of Table 16 was that with the possible exception of question 5, no major differences in the response patterns of SIP-Only and SIP-Telelecture teachers were observed. Moreover, there was a notable tendency for teachers to be evenly divided in their responses to most questions. This tendency is evidenced by the number of item responses in the vicinity of 50 percent.

Only sightly over half of all teachers involved in inservice instruction, for example, indicated that it was "worth their time" to participate in the program. This finding, even though limited because of its self report nature, suggests that the inservice program had little practical meaning or significance for a substantial number of teachers.

Table 16

PERCENT OF TEACHERS RESPONDING TO FIVE
QUESTIONNAIRE ITEMS BY INSTRUCTIONAL TREATMENT GROUP

Question	SIP-Only (n = 28)[a]			SIP-Telelecture (n = 39)			Total (n = 67)		
	Yes	No	Means	Yes	No	Means	Yes	No	Means
1. Recalling the study, do you feel it was worth your time to participate?	50[b]	50	--	54	46	--	52	48	--
2. Do you feel that a typical elementary school staff could conduct a similar inservice program without the help of outside consultants?	43	50	7	41	59	--	42	55	3
3. Did you analyze any of your own tapes?	61	39	--	56	44	--	58	42	--
4. Did you learn any new ideas from your study of interaction analysis?	64	29	7	62	21	18	63	24	13
5. Have you been able to apply any ideas or innovations that were generated by your study of the materials?	39	36	25	51	33	15	46	34	19

[a] Results are reported for all teachers present at the questionnaire administration and not just the ten teachers in each school whose tapes were subjected to interaction analysis.

[b] Reported to the nearest percent.

Evidence of the program's impact can also be inferred from responses given to question 3. Approximately 40 percent of participating teachers indicated that they had never attempted to utilize the tools of interaction analysis for the purpose of analyzing their own taped lessons. In the interest of the self-instructional programs, the response distribution to question 3 constituted a disappointing finding. These results also can be used to partially explain the failure of teachers to achieve a high degree of subject matter competency in interaction analysis skills. It can be reasoned that had the materials presented and discussed in the program been perceived as highly relevant, the vast majority of teachers would have critically examined their teaching performance in light of their newly acquired knowledge of classroom verbal interaction. To some extent self-examination appeared to have occurred, however, the fact cannot be overlooked that over 40 percent of teachers admitted that no such attempt was made.

The responses to questions 4 and 5 contained in Table 16 were difficult to interpret meaningfully. Concerning question 5, slightly over 60 percent of teachers said that the inservice experience had resulted in generation of at least one new idea. The problem with interpreting such a finding, however, is that the wording of this question probably favored a positive reply. It is reasonable to assume that many participants would be reluctant to admit openly that they have been mentally passive or unproductive irrespective of their evaluation of an experience. To an extent, the number of teachers indicating that they had been able to apply interaction analysis learnings in their teaching (i.e., 46 percent) may be similarly inflated for the very same reason.

It was implied earlier that a discrepancy was suspected between the manner in which SIP-Only and SIP-Telelecture teachers replied to question 5. A two-way classification chi square analysis was performed to test the suspected discrepancy. Specifically, a 2 x 3 contingency table was constructed where types of instructional treatment constituted the first classification variable and type of response (yes, no, or no answer) comprised the second variable. The calculated χ^2 of 1.82, with two degrees of freedom, failed to achieve significance at the .05 level. Consequently, the null hypothesis of no difference between SIP-Only teachers and SIP-Telelecture teachers in terms of their response distributions to question 5 had to be retained.

Although difficult to summarize quantitatively greater insights into teachers' reactions to the inservice programs were obtained by a perusal of open ended questionnaire responses. In an attempt to capture the essence of the participants' reactions to the project, highly representative and informative teacher comments, quoted directly, are presented below. Teacher quotes are organized by schools for each major question and subquestion contained on the questionnaire. Where appropriate, interpretive comments of the investigators are contained within parentheses.

QUESTION 1. DO YOU FEEL IT WAS WORTH YOUR TIME TO PARTICIPATE?

(a) WHY?

School A (SIP-Only)

"Takes too much time."

"Not enough supervision and cooperation."

"Knew too little about study and what it was trying to prove."

School B (SIP-Only)

"Too involved for the benefit gained."

"This study could have been very helpful if we had been given enough released time and if we had been given a chance to volunteer instead of being pressured into it by our administration."

"Motivation was poor by our administration."

School C (SIP-Only)

"Made me more aware of verbal behavior in the classroom." (This comment represented the general consensus in School C)

"Made me stop and examine my teaching methods."

"New ideas gained and knowledge of what's new in educational field."

School D (SIP-Telelecture)

(The candid opinion of approximately a third of the teachers was that the study was worthwhile because "it made me see what I was doing." The other two-thirds felt that it was too time consuming.)

School E (SIP-Telelecture)

(Too time consuming was the most frequent complaint. A unique comment: "More time should have been given to explaining the project and more time for telelecture.")

School F (SIP-Telelecture)

"Made me more conscious of children's feelings and my part in creating them."

"Became more aware of my own attitudes toward my own pupils."

"Purpose of study vague. Smug, derisive attitude of U.T. Representative offensive. Not enough ground work laid prior to study."

(b) DID YOU FEEL THAT THE TIME SUGGESTED (one hour) FOR THE LESSONS WAS APPROPRIATE? WHY?

School A (SIP-Only)

"Beginning lessons were about right, last lessons were too short because they were not as easily understood."

School B (SIP-Only)

"Required much more time to be successful."

"This was not enough time to master the concepts presented and become accurate in analyzing tapes."

"More released time was needed, and also someone should have been responsible as a leader."

School C (SIP-Only)

"I couldn't seem to get everything."

"Need more time for better understanding."

School D (SIP-Telelecture)

"This was time enough to learn only because of the help from telelecture."

(Several teachers, however, expressed the opinion that the time alloted was insufficient.)

School E (SIP-Telelecture)

(The majority of the teachers felt that the time was sufficient if extra work was done after school. Two teachers did indicate that more time was needed, however.)

School F (SIP-Telelecture)

"Did not feel I am able to record findings on tape."

"Does not allow time for actual learning and is not time to develop skill required."

"First few lessons needed more time."

(c) HOW COULD THE ADMINISTRATION OF THE STUDY HAVE BEEN IMPROVED?

School A (SIP-Only)

"More inservice training consultant."

"By giving more specific instructions or by being more exact."

School B (SIP-Only)

"More discussion of project at the beginning."

"More released time."

"We needed someone to come and talk in middle of sessions--promote valuable discussions."

"Each teacher should have a tape recorder."

"More direction from researchers."

"A choice of participation or not."

School C (SIP-Only)

"By having an outside consultant working with the teachers during the study sessions."

"More assignments, testing and problems given within textbook."

School D (SIP-Telelecture)

"More planning and experienced help."

"More understanding before beginning."

"Tapes at own grade level."

"Telelectures inconvenient after school."

"1 hour telelectures."

School E (SIP-Telelecture)

"Do without a lecture period."

"Orientation should have been handled more diplomatically."

"More telelectures."

"Less taping."

School F (SIP-Telelecture)

"Sessions after school hard when tired."

"Make demands clearer."

"Classroom stiuation with co-ordinator present."

"More time for scoring tapes."

"Less hurried introduction, tapes hard to understand mechanically."

"The teachers' attitude would have been better had they understood that a written test was to be conducted at the end."

(d) DO YOU FEEL THAT A TYPICAL ELEMENTARY SCHOOL STAFF COULD CONDUCT AN INSERVICE PROGRAM SIMILAR TO THIS STUDY?

School A (SIP-Only)

"The elementary staff would know the needs better than an outsider, but I feel professional consultants are helpful in any program."

School B (SIP-Only)

"Need guidance and knowledge of consultant to answer questions and encourage and stimulate."

School C (SIP-Only)

"If more time is made available for the teachers to study the project."

"If we had outside help to call in on occasion."

School D (SIP-Telelecture)

"Consultant necessary for clarifying and answering questions."

"Without telelecture I wouldn't have benefited at all."

School E (SIP-Telelecture)

(Most of the teachers felt that they were intelligent enough to conduct the program and that the manual was sufficiently self-explanatory.)

School F (SIP-Telelecture)

"Time element prevents average staff from properly preparing itself."

"Would be necessary for someone on staff to be trained in I.A."

"Consultant necessary for introduction."

"Cooperation necessary on part of all teachers."

(e) DO YOU FEEL THAT OUTSIDE CONSULTANTS WERE ESSENTIAL TO THE IMPLEMENTATION OF THE PRESENT STUDY?

School A (SIP-Only)

"Yes, everything was new."

School B (SIP-Only)

"...it would be more stimulating."

"More direction would be of help, and perhaps the negative attitude toward the project would not have crept in."

"They might have helped us to discover sufficient value in the course to justify the time and changes in teaching plans given."

School C (SIP-Only)

"They were not present enough to tell."

"I think written explanation would be sufficient."

"Need more details on what the course consists of before starting."

School D (SIP-Telelecture)

"Consultants necessary for understanding, clarification, and simplification."

"Consultant helped with many problems."

School E (SIP-Telelecture)

"Consultant made it easier to understand."

"Newness made help necessary."

"Consultant necessary to generate enthusiasm."

School F (SIP-Telelecture)

"If teachers know what and why a study is being made they can carry on."

"They didn't make things appear as they really were after they came. I suggest more preparation on their part."

QUESTION 2. IF YOUR STAFF WAS INVOLVED IN ACCOMPANYING TELELECTURE SERIES, DO YOU FEEL THAT IT AIDED YOU IN UNDERSTANDING THE SELF-INSTRUCTIONAL MATERIALS?

(a) HOW DID IT HELP, OR FAILED TO HELP, YOU?

School D (SIP-Telelecture)

"Explained material further and cleared it up." (The general consensus)

"Did not help because it only covered the book." (Three teachers made the above or similar responses.)

School E (SIP-Telelecture)

"More personal contact."

School F (SIP-Telelecture)

"Focused attention on material such as the matrix and analyzing tapes."

(b) HOW COULD THE TELELECTURE SERIES HAVE BEEN IMPROVED?

School D (SIP-Telelecture)

"Longer telelectures."

"Better organized and different time of day."

"More time for discussion and questions."

School E (SIP-Telelecture)

"Machines needed clearing up."

"Discussions not lectures."

"More telelectures."

"Should not have been after school."

"Should have not had telelecture every week."

"Poor audio reception."

School F (SIP-Telelecture)

"More groundwork--prior to study."

"A more willing class."

"We should have been told we were to be tested."

QUESTION 3. DID YOU LEARN ANY NEW IDEAS FROM YOUR STUDY OF INTERACTION ANALYSIS?

School A (SIP-Only)

(Three teachers indicated that children should be given more of a chance to talk.)

School B (SIP-Only)

"Freedom in teacher-pupil communication."

"A positive approach to student comments and ideas leads to a more meaningful discussion. I don't need to talk as much as I thought I did to get a point or idea across to the students."

"In lower grades, faster paced (quest.-answer-quick reward) seem to be most stimulating and interesting to the children."

School C (SIP-Only)

"Effects of teacher verbal behavior. Method of teaching can be improved."

"Use of an easel board as an 'attention getter.' "

"Children should be given more freedom in the classroom instead of teacher having to direct."

Cedar Hill

School D (SIP-Telelecture)

"Let students talk more."

"Sensitivity to students' feelings."

"Awareness."

School E (SIP-Telelecture)

"Not letting subject drift as much."

"Variety of phrasing."

"Application of indirect methods."

"Pupil participation."

"I learned that most of the children in my classroom have very good ideas about most things and are willing to express their ideas."

"It strengthened my belief that children must be individually involved in the learning process."

School F (Sip-Telelecture)

"It helped me to look at myself objectively."

"Use of tape recorder."

"...I was talking too much."

(d) BRIEFLY DISCUSS THE APPLICATION OF THESE IDEAS

School A (SIP-Only)

"I try for more student response."

School B (SIP-Only)

"I.A. has helped me to accept and make use of the ideas initiated by my students. To view my classroom performance in light of my intentions."

School C (SIP-Only)

"I have tried lowering my voice somewhat..."

School D (SIP-Telelecture)

"More praise of students."

"Vary methods."

"Less lecture, more discussion."

"Expression for slow students."

School E (SIP-Telelecture)

"Vary class."

"Awareness that the children have the ability to conduct a discussion without necesity of questions."

"Try to be conscious of method of responding to child."

"Increase freedom of pupils."

"Use of children's ideas and feelings to build lessons."

School F (SIP-Telelecture)

"Use of more indirect teaching."

(e) WHAT CONDITIONS WOULD HAVE HELPED YOU APPLY THE IDEAS GAINED FROM THE STUDY?

School A (SIP-Only)

(None of the replies pertained to the question.)

School B (SIP-Only)

"Consultants, released time, more directed study."

"More time for analyzing and taping."

School C (SIP-Only)

"Smaller number of students in class."

"To have been instructed by experienced personnel."

School D (SIP-Telelecture)

"Smaller class rooms."

"Hearing elementary tapes."

"Better behaved pupils."

"Subject, math difficult to use Interaction Analysis."

"More time."

School E (SIP-Telelecture)

"More time for planning out of class."

"Tape recorder in each room."

"More study time on the text."

"By teaching another subject other than math."

"Longer telelectures."

"Less time taping and more time on book."

School F (SIP-Telelecture)

"More time."

"Hearing tapes on grade level."

"Free time."

"To have part in planning."

"More time and a trained leader who could have come every week in person and would have seen we were not becoming prepared in the time given."

"More practice."

"More advanced preparation."

"Teacher acceptance of study."

QUESTION 4. LIST WHAT YOU FEEL WERE THE STRONG AND WEAK POINTS OF THE STUDY

(a) STRONG POINTS:

School A (SIP-Only)

"Help us analyze the classroom situation..."

School B (SIP-Only)

"Very clear, well-written booklet, tapes okay (except for adult discussion one), following tapes with explanation."

"Helped teachers view classroom performance in light of intentions."

School C (SIP-Only)

(Teachers missed the point of the question.)

School D (SIP-Telelecture)

"The purpose."

"Dr. Tea." (the telelecturer)

"Help in getting out of 'rut.' "

"Being exposed to different methods."

"Improved teaching."

School E (SIP-Telelecture)

"The booklet."

"The telelecture."

"Categories well defined."

"Improve teaching."

School F (SIP-Telelecture)

"Self-examination."

"Good for analyzing teaching."

"Take stock of teaching."

"Exposure to new methods."

(b) WEAK POINTS:

School A (SIP-Only)

"Can't be successful in primary grades."

"Tape recorders gave too much trouble."

"The children despise it."

"Took too much time away from children."

"Inservice when teachers are tired."

"No pay."

School B (SIP-Only)

"Each teacher needs a tape recorder."

"Subject assigned to tape difficult to tape."

"Too time consuming."

"Hazy definition of interaction analysis."

"Attitude of students--too conscious of taping."

"Chapters hard to understand."

School C (SIP-Only)

"Too time consuming."

"A better understanding of the whole course to begin with, or what the course consisted of and what was to be expected."

"No consultant."

"All the tapes were of Junior and Senior High groups and my work is with 7 and 8 year olds."

School D (SIP-Telelecture)

"Lack of planning."

"Too few tape recorders."

"Teachers not briefed beforehand."

"Lack of time."

"Caused unnatural classroom situation."

"Booklet not enough without telelecture."

"Time of day of study."

"Need for instruction in using a recorder."

"Planners were not familiar with problems of elementary teachers."

"Better tapes."

School E (SIP-Telelecture)

"Took too much time from regular week for study."

"Shy children made overly nervous."

"Mechanical difficulties with recorder."

"Disturbed students."

"Poor introduction to course."

"Taping sessions too long."

"3 tapes too many a week."

"Research too drawn out."

"Teachers should be consulted in plans."

School F (SIP-Telelecture)

"Explanation should have been made in early school year."

"Felt pushed into experiment."

"Vague objections."

"More information on the experiment."

SUMMARY AND DISCUSSION

Summary

The purpose of this field experiment was to determine the efficacy of a self-instructional program in the Flanders' System of Interaction Analysis. The specific program tested was developed for use in inservice teacher education by the Appalachian Educational Laboratory, and two instructional modes of presenting the self-instructional program were examined. The utilization by inservice teachers of the self-instructional program without access to either additional materials or knowledgeable instructors constituted the first mode, or method. The second also consisted of the utilization of the self-instructional program; however, the program was used in conjunction with telelecture presentations offered by a college instructor highly versed in interaction analysis. The answers to four specific questions relating to the effectiveness of the self-instructional program in terms of teacher and student behavioral change were sought by this research. The questions were:

1. Are teachers able to learn the fundamentals of interaction analysis as a result of working with the self-instructional program within the context of a 12-hour inservice course?
2. As a result of working with the self-instructional program, will teachers manifest greater flexibility (greater indirect influence) in their classroom verbal behavior?
3. Will students of teachers working with the self-instructional program display greater involvement in the instructional process as a result of their teachers' training in interaction analysis?

4. Will the effectiveness of the self-instructional program relative to mastering the fundamentals of interaction analysis and promoting greater teacher flexibility be enhanced through the use of accompanying telelecture presentations?

The teaching faculties of nine elementary schools in eastern Tennessee participated in the field experiment. Three schools received the self-instructional program only (SIP-Only), three schools received the self-instructional program augmented with telelecture transmissions (SIP-Telelecture), and the remaining three schools served as controls. The field experiment was conducted during an 18-week period which spanned the last semester of the 1967-68 school year.

Teachers in the nine participating schools audio-taped three 20-minute lessons in either mathematics or social studies each week throughout the 18-week experiment. Beginning with the 4th week, the teachers employed by the six experimental schools commenced instruction in the Flanders System of Interaction Analysis. The instructional treatment consisted of an inservice faculty meeting, scheduled for one hour each week for a period of 12 weeks, which was devoted to a formal consideration of interaction analysis utilizing one of the modes of instruction under study. The remaining three weeks constituted a post experimental assessment period.

Within each of the nine participating schools, 10 teachers, five teachers taping only mathematics lessons and five teachers taping only social studies lessons, were randomly identified. The audio tapes produced by the 90 teachers over the 18-week period were rated according to the Flanders System by a trained staff. Eight quantitative indices associated with the Flanders System (i.e., ID ratio, revised ID ratio, etc.), in addition to scores earned by teachers on an interaction analysis achievement examination served as dependent variables. Interaction analysis indices were analyzed by a 3 x 3 x 2 x 6 anovar while a 3 x 3 x 2 anovar was employed to ascertain teacher achievement relative to interaction analysis knowledge and skill.

Result of achievement data suggested that participants had acquired at least an elementary knowledge of interaction analysis; however, differences between instructional modes were not observed. Moreover, inservice teacher achievement was not as high as that observed in the sample of preservice teachers. Analyses of eight interaction analysis indices failed to provide evidence which would indicate that the two inservice instructional treatments were effective relative to promoting either greater teacher indirect influence or student involvement. And as revealed by a post-instructional questionnaire, diversity of opinion characterized teacher reaction to the project.

Discussion

The obvious conclusion eminating from this research effort was that the effectiveness of the inservice self-instructional program could not be varified on the basis of criterion variable analyses. This study, therefore, joins the ranks of the vast majority of investigations which have attempted to assess the differential effectiveness of teaching methods and which have been able to report only "nonsignificant results." Greater confirmation is thus afforded the emerging tenet in educational research which states that it is extremely difficult to empirically demonstrate that one method of instruction is better than another. But it must be remembered that the present investigation, among others, was limited in terms of the measures and instruments used to detect behavioral change. The present investigation employed measures which may not have been sensitive enough to detect change. Or possibly, the "wrong" kinds of questions may have guided the conduct of the research. That is to say, the interaction analysis inservice experiences may have been responsible for significant teacher behavioral change, however, such change was not detected by the particular methods employed in this study. The results associated with this study should not be ridgidly interpreted as indicating that the inservice instruction treatments were not effective. Rather, the results should be viewed as a failure to demonstrate the effectiveness of the self-instructional program in relation to the dependent variable selected for study.

The analysis of ID ratio data was of particular interest to the investigators because from the study's conception, the ID ratio had been viewed as the most significant behavioral measure. It was reasoned that had greater teacher flexibility been achieved, then it would logically be reflected in the emittance of more indirect teacher statements and thus higher ID ratios. Results revealed, however, that instead of increasing over time, the ID ratios for both instructional groups and the control group were found to decline over time. Even without the enlistment of statistical tests, the trend, depicted in Figure 3, was quite discernable.

It has been suggested that the negative ID Ratio trend can be explained by the increased press placed upon teachers as the termination of the school year approaches. Prescribed units have to be covered, students and teachers become indifferent and bored, and thus lessons tend to become perfunctory. It can be argued that if these conditions accurately characterize the last six or seven weeks of the school year, then a trend toward the increased exercise of direct behavior by the teacher constitutes a plausible hypothesis. The consensus of these investigators, however, is that experimental artifacts peculiar to this investigation present a more viable explanation. For example, it can be seen that teachers under all levels of the instructional variable produced disordinately high ID ratios during the initial phase of the experiment. The mean ID ratio for all teachers during the first three weeks (the preinstructional period) was 1.64. When contrasted to the normative ID ratio performance of elementary teachers reported by Furst and Amidon (1967), in which group ID ratios in excess of 1.00 were shown to constitute rare events, sufficient evidence is available to suspect a spuriously high rate of indirect teacher behavior during at least the first nine weeks of the study. Since the control group teachers also demonstrated the same pattern over time, the audio tape recording assignments appear to lie close to the source of the phenomenon. Specifically, it is hypothesized that initially the act of tape recording lessons was highly reactive. Further, teachers responded to the reactive influence by marshalling their resources and, consequently, displayed atypical teaching performances. That is, it is suspected that because lessons were being taped, an extra effort was put forward by teachers to involve students in the learning process.

As the weeks progressed and lesson taping approached the status of a routine activity, the obtrusive influence of the tape recorders probably decreased. Similarly, the motivation on the part of the teacher to "put her best foot forward" also tended to decrease. It follows that ID ratios of less magnitude observed in the latter weeks of the experiment represent a more accurate reflection of "true" ID ratios. To the extent that the hypothesis just advanced is viable, severe limitations are ascribed to the majority of previously reported studies in interaction analysis since most studies have employed either audio taping or, more commonly, trained classroom observers. The contaminating effects of the threat and novelty associated with such obtrusive measuring strategies are probably existent to a greater extent in earlier studies reported in the literature because only a limited number of classroom observations were made. Consequently, there is a strong possibility that the majority of interaction analysis investigations have reported results that are applicable to only situations where the reactive climate described above is present. In other words, the external validity of many previous experiments is being questioned. Unfortunately, the investigators are unable to suggest alternate methods of analyzing classroom verbal behavior short of surreptitious means. However, the highly reactive nature of audio taping suspected in this research presents a clear challenge to researchers contemplating future work involving interaction analysis.

A discussion of the field experiment should include comments pertaining to both (a) possible improvements in programmatic activity and (b) teacher reactions to the project. Concerning the former, during staff visitations to the participating schools, informal conversations with participating teachers produced several suggestions concerning the use of telelecture in the inservice program. For the most part, the suggestions related to the format of telelecture presentations. Several teachers, for example, offered an alternate organizational strategy for the inservice sessions. Specifically, instead of devoting the first half of the inservice session to working with the self-instructional program and the remaining half hour to the telelecture mode, it was suggested that sessions should be devoted exclusively to one of the two modes and modes should be alternated weekly. The alternating procedure would be employed throughout the inservice training period. The basis for this suggestion was that on several occasions teachers were either engaged in discussion, listening to taped materials included in the self-instructional program, or they were struggling through a reading assignment only to be interrupted in the middle of these activities by the scheduled telelecture presentations. In short, some teachers felt that the timing of the telelecture was disruptive. Another teacher-initiated recommendation was that the number and nature of specific telelectures should not be predetermined by outside specialists. Instead, teachers should decide when a telelecture would facilitate learning. When such occasions arise, teachers would be responsible for requesting a telelecture specifically geared to treat the problem area.

In both instructional groups, the most frequent and strongest suggestion dealt with released time for participating in inservice instruction. Teachers frequently indicated that at the end of a full teaching day, they were in no mood to spend an additional hour in an inservice program. Teachers argued that if the inservice course constituted a worthy professional activity, then participation should be scheduled during the regular school day and not at a time which is not conducive to learning, and which constitutes an infringement upon their personal lives. The failure to provide release time was unquestionably a serious concern of participating teachers, and this concern should be entertained in future inservice programmatic and research ventures.

There were indications, gleaned from both sight visitations and teacher responses to the questionnaire, that an unfavorable attitude toward the project was possessed by some teachers. Frankly, in a few instances, the attitude of teachers can be more accurately described as "hostile." Obviously, this reaction must be considered as a influence which probably affected experimental findings.

Unfortunately, prior provisions had not been made that would have allowed for an assessment of the relationship between teacher attitude and behavioral change. However, several explanations as to the source of the negative posture assumed by some teachers have been advanced by project personnel, and the remainder of this report is devoted to a brief discussion of these explanations.

In the opinion of the investigators, a major factor which possibly contributed to the negative set in question was the sudden and abrupt introduction to the project that teachers received. With little or no preparation, teachers were given an overview of their responsibilities as project participants and were informed that audio taping was scheduled to begin the following week. Because teachers were not afforded a great deal of time to psychologically acclimate themselves to the task, some teachers apparently experienced a degree of duress. It should be mentioned that the brief project orientation period was not so much a function of design as it was of necessity. Upon official approval to conduct the study, only two weeks were available to prepare teachers before the date at which the project had to be launched if the eighteen-week project period were to remain unaltered. In retrospect, the investigators' experience suggests that the crash orientation to the project did not serve to facilitate maximum cooperation of participants, and further, points to the desirability of involving teachers gradually in their project assignments.

Somewhat related and undoubtedly confounded with the effects of the abrupt project introduction was the fact that teachers were not discernably afforded the opportunity to choose whether or not to participate. In effect, principals were informed by their respective superintendents that their schools' cooperation was expected and in turn, teachers were informed by their principals that they would be expected to participate. There appeared to be few instances where quasi-democratic procedures were used to enlist the assistance of schools and teachers. Methodologically, complete freedom of choice relative to participation militates against the validity of the study; however, a situation where participants are not provided the semblance of choice threatens the degree to which teachers identify with the project, and thus, attenuates enthusiastic cooperation. The investigators believe that to a degree, the absence of democratic procedures prompted some teachers to feel that the project was being forced upon them from outside agencies, i.e., their central administration and the University of Tennessee. Resistence on the part of some faculty members is documented by the fact that during the week prior to project launching, several school principals contacted project personnel and requested additional meetings with their faculties. The requests were prompted by growing faculty opposition to the project. As noted previously, faculty discontent was so great in one school that they formally requested not to be included. Their request was honored. Needless to say, such an attitude probably had a deliterious effect upon the findings although specification of this effect is not possible. The importance of a gradual introduction into the project which permits teachers some opportunity to identify both with the project and to feel that they are participating in some small measure in the decision making process was a lesson which was relearned in the face of faculty opposition.

Finally, it is generally accepted in educational circles that at all levels of instruction, kindergarten through graduate school, many teachers either overtly or covertly resent uninvited observers in their classrooms.

There is ever present the threat that one's teaching performance will not be viewed favorably. Certainly, being required to audio tape classroom lessons constitutes an uninvited observer which, it has been conjectured, produced, at least initially, a threatening situation. The observation has been stated previously that in relation to the total scope of project activity, teachers appeared to express greatest concern over the audio taping assignments. This observation combined with subjective knowledge about teachers gained from frequent interaction with teachers lends credibility to the hypothesis that the audio taping presented a threat to some teachers. Further the natural resulting negative set established by the taping assignments generalized to all phases of project involvement. In addition, to protect the experimental integrity of the project, the investigating team was unable to disclose fully the intent of the study and the role that lesson taping played in the overall strategy. Therefore, varying measures of mistrust, especially as concerned the lesson taping assignments, may have been harbored by participants which would certainly not serve to extinguish any anxiety associated with project participation.

In summary to the extent that the suspected negative set possessed by teachers prevailed during the instructional phase, little in the way of either content mastery or behavioral change would be expected. Perhaps within an inservice context, the success of any programmatic effort depends as much on the manner in which course participation is enlisted as on the engineering and design of the course materials themselves. These investigators recognized the possibility that the reported findings may be as much a reflection of the administration of the project as they are an indication of the merits of inservice self-instruction in interaction analysis.

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APPENDIX A

INTERACTION ANALYSIS PROJECT

Appalachia Regional Laboratory
The University of Tennessee

PARTICIPATING SCHOOL INFORMATIONNAIRE

1. Name of school:____
2. Address of school:____
   (street)
   ____
   (county)
3. School telephone:____
4. Name of principal:____
5. Name of school secretary:__________________________________
6. Number of teachers eligible for participation in the project (a teacher must regularly instruct in mathematics and social studies):__________________
7. Name of person employed at the school that might serve as the "coordinator" for activities in that school:__________________________________
8. The time at which activities terminate for the typical school day:____________
   (a) Time at which students normally leave:________________________
   (b) Time at which teachers normally leave:________________________
9. Do you know the telephone company that services this school (e.g., Southern Bell, Powell, etc.):____
10. Does the school have only one telephone line:________________________
11. Is there any additional information which you have that might assist us in our efforts to assign an experimental condition to this school:__________________
    ____
    ____
    ____
    ____
    ____

APPENDIX B

AN OVERVIEW OF THE INTERACTION ANALYSIS PROJECT

The Appalachia Regional Educational Laboratory and the Bureau of Educational Research and Service at The University of Tennessee are requesting your cooperation in an inservice training project.

The project has as its ultimate goal the refinement and development of an inservice training program in the Flanders' System of Interaction Analysis. Some time ago, the Appalachia Regional Laboratory encouraged a group of professors at Marshall University to develop a set of self-instructional materials for Interaction Analysis. Upon completion of these materials, the Laboratory felt that they held great promise for inservice instruction throughout the region which it served. However, before a large scale commitment could be made, these self-instructional materials had to be field tested. That is, the Laboratory wanted to determine if these materials would be appropriate for use within an inservice training program. Therefore, the basic question underlying this field investigation is: Within a twelve week training period where teachers devote on hour a week to working with the self-instructional materials, can teachers effectively learn Interaction Analysis.

Interaction Analysis is a relatively new term in education and therefore you are probably asking yourself what Interaction Analysis is all about. If these self-instructional materials prove to be effective, you will be an expert at the end of the twelve week training period and will be able to provide a detailed answer to this question. For now, however, Interaction Analysis can be briefly described as a method which enables a teacher to be aware of her classroom behavior and the influence that this behavior has on her students. Interaction Analysis was originally developed by

Dr. Ned Flanders, now at the University of Michigan, and is currently being used extensively by Dr. Edmund Amidon of Temple University with undergraduate students in education. (Little use of this system has been made in inservice teacher training however.) This system categorizes verbal behavior according to a ten-step classification. A teacher, using tape recordings of lessons that she has taught, can tabulate her verbal interaction according to this ten-step scale. These tabulations are entered into a ten by ten matrix which, after sufficient training, she can meaningfully interpret.

As a teacher confronted with many demands on your time, you are naturally concerned about the nature and extent of your individual participation in this project. Essentially, your participation consists of two activities. The first is the tape recording of three lessons per week for a period of eighteen weeks. This phase of the project is necessary to effectively evaluate the self-instructional materials. Beginning the second week in January, we are asking you to record three lessons each week in either mathematics or the social studies as it is broadly defined. Approximately half of the teachers in your building will be taping only mathematics lessons while the other half will be taping only lessons in the social studies. A lesson is suitable for taping if it is one which is characterized by teacher, student, or teacher-student verbalization. At least twenty minutes of conversation occurring during the lesson is desired. As previously noted, it is necessary to tape three twenty minute lessons per week for a period of eighteen weeks.

The second area of cooperation concerns your participation in the inservice training course. This course will begin three weeks after the initial taping of lessons. At a designated hour each week, teachers in your school will be released for the purpose of working with the self-instructional materials. The materials consist of (1) a self-instructional workbook and (2) tapes which accompany the booklet. During the hour, teachers will break up into small groups (two to four teachers per group) for the purpose of reading the self-instructional booklets, discussing the ideas contained in the booklets, and listening to the tapes which accompany the booklet. The course is scheduled to last for twelve weeks.

Please note that you will be still recording three lessons per week during the twelve week course. Also, we are requesting that you record three lessons a week for the three week period following the inservice course. This brings the total number of weeks in which tape recordings will be made to eighteen.

In addition to your participation in the course and the taping of three lessons per week for the eighteen week period, we are requesting that you learn how to operate the tape recorders that the Laboratory will provide and have a thorough understanding of the coding and labeling systems that will identify your tapes. A separate set of directions is enclosed which describe the operation of the tape recorder and the labeling and coding system to be used in this project.

If at any time you have questions relating to your participation in the proposed project which cannot be resolved by your principal, please do not hesitate to call (collect) the Bureau of Educational Research at the University of Tennessee.

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The second area of cooperation concerns your participation in the inservice training course. This course will begin three weeks after the initial taping of lessons. At a designated hour each week, teachers in your school will be released for the purpose of working with the self-instructional materials. The materials consist of (1) a self-instructional

APPENDIX C

CODING INFORMATION

All information and data obtained from this project will be considered confidential; hence it will be necessary to attach to each taping session certain coded lists of information. The five following bits of identification are required:

1. School - Coded by Letter, i.e., A, B, C, etc.
2. Teacher - Coded by Number, i.e., 1, 2, 3, etc.
3. Grade - Coded G Plus Number, i.e., G1, G2, G3, etc.
4. Date - Month and Day (January 8)
5. Subject Area - Mathematics or Social Studies

To assure permanence and accuracy the above information will be recorded twice. First, it will be record at the beginning of each taping session on the tape itself. The second procedure involves writing the same information on the back of the tape box after a particular lesson is over.

First Procedure

First turn on the tape recorder. Then, verbally record the five pieces of information before you actually start taping the lesson. Below is an illustration of this procedure:

1. Say the word "School" (Then the letter which has been assigned to your school)

   "School A"

2. "Teacher" (then your personal code number)

   "Teacher 10"

3. "G" (Then the grade you are teaching at that specific taping session)

   "G6"

4. Record the date

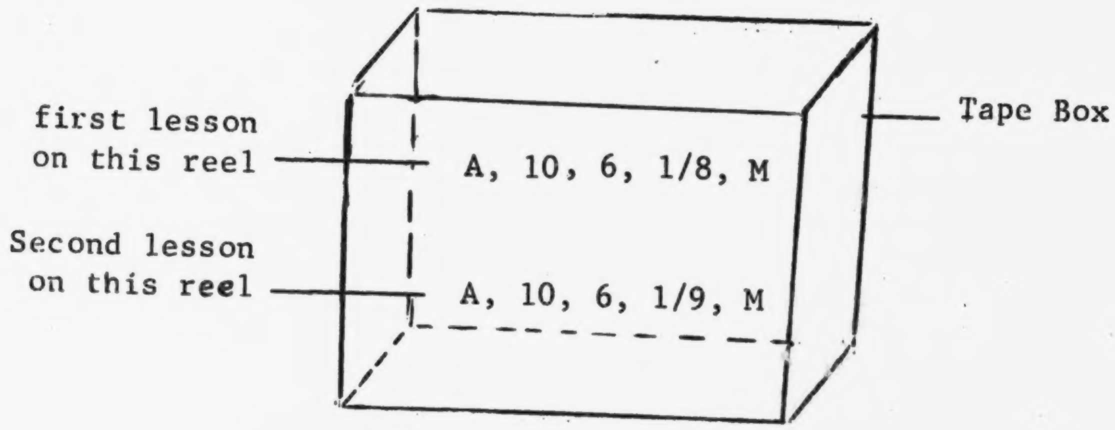
   "January 8th"

5. Record subject area

   "Mathematics"
   or
   "Social Studies"

Second Procedure

After the class has been dismissed, write the same information on the tape box. Remember that two 20 minute taping sessions will be recorded on each tape reel. Since the back of the box is quite small write the information as depicted on the next page.


first lesson on this reel
A, 10, 6, 1/8, M
Tape Box
Second lesson on this reel
A, 10, 6, 1/9, M

Note, essentially the code is the same as it was for the first procedure:

A = School Code
10 = Teacher Code
6 = Grade
1/8 = Date
M = Mathematics

There is no need to write the words school teacher, etc. Always put the first session on the top lines.

We appreciate the care we know you will take in recording this information.

APPENDIX C

REMINDERS FOR TAPING PROJECT

I. WALL PLUG CONNECTOR

Since we have received the electrical connectors, we would like to have you use this connector exclusively. You may obtain this connector from your principal.

This connector plugs into the outlet on the left-hand side of the recorder, and the other end is plugged into an ordinary electrical wall socket. It is particularly important that you use the wall-connector and not the batteries when you are recording.

II. CODING INFORMATION

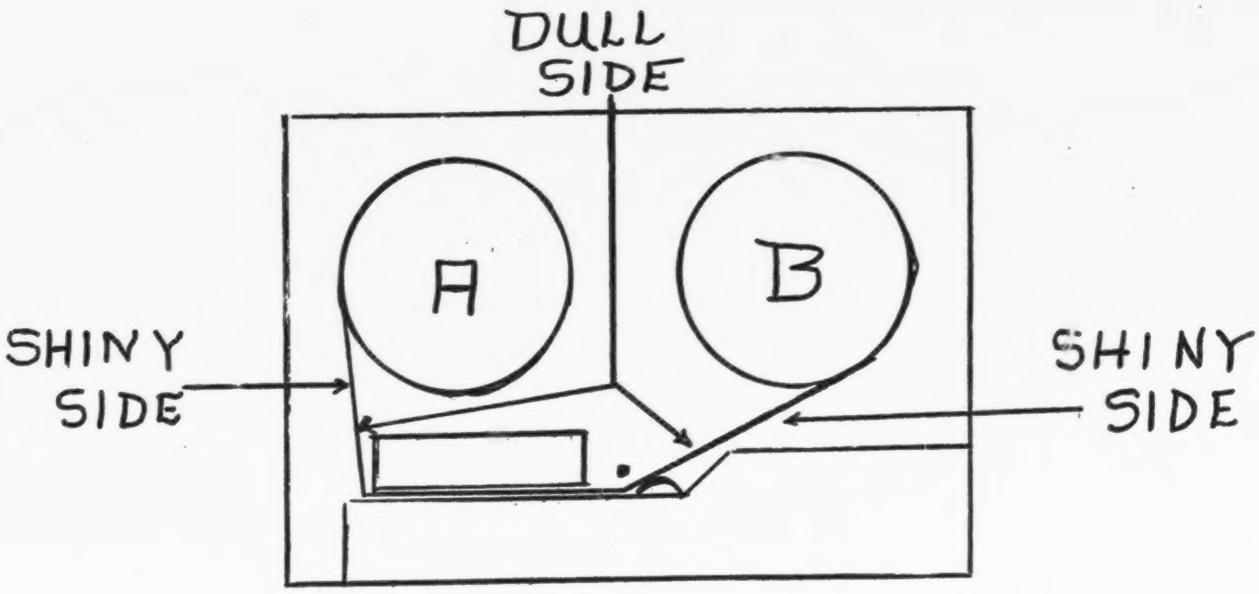
Be sure that you are correctly coding the classroom session; that is, you are saying at the beginning of the recording session: "School A, Teacher 10, G6, January 26, Mathematics," for an example.

Also, be sure to place the same information on the outside of the small boxes that you are putting the tapes in. Check the previous handout (Coding Information) as to the exact procedure.

III. TAPE RECORDING INFORMATION

We have discovered that some of the teachers have had a common difficulty recording two 20 minute sessions on each reel of tape. The following outline may be of some assistance.

1. Assume Reel A (in below diagram) is a brand new reel of tape. When you finish the first session all the tape must be on Reel B. To help you recall which side of the tape you have recorded, you might place a small piece of Scotch tape on the top of Reel B before removing it from the machine.
2. To record the second session, flip Reel B over and place it on the left spindle. The side with the Scotch tape should now be underneath, and the tape should be moving from left to right.
3. A simple check to see if the recorder is set up properly to record the second session is to note that the shiny side must be facing outward (as depicted in the diagram).



APPENDIX D

INTERACTION ANALYSIS STUDY QUESTIONNAIRE

The purpose of this questionnaire is to gain your perceptions of the recently completed interaction analysis study. Please identify yourself by the code number you used on your tapes for the study. The responses that you offer will enable us to make improvements in future inservice courses. All information will be considered confidential.

__________ Teacher Code Number

__________ Age

__________ Subject area taped

__________ Grade taught

__________ Male or female

__________ Degree earned

__________ What type of certification do you hold?

__________ Years of teaching experience

__________ Years since you last took a professional educational course

1. Recalling the study, do you feel it was worth your time to participate?

   a. _____ Yes _____ No Why? ______________________________

   ____

   b. Concerning the time suggested (one hour) for each of the lessons in the self-instructional booklet, do you feel it was too short, about right, or too long? ________________ Why? __________

   ____

   c. How could the administration of the study have been improved?

   ____

   ____

   d. Do you feel that a typical elementary school staff could conduct a successful inservice education program similar to this study without the help of outside consultants? _____ Yes _____ No

   Why? ____

   ____

e. Do you feel that outside consultants were essential to the implementation of this present study? _____ Yes _____ No Why? _____

____

____

f. Did you analyze any of your own tapes? _____ Yes _____ No

g. Did you help analyze a fellow teacher's tapes? _____ Yes _____ No

2. If your staff was involved in the accompanying telelecture series, do you feel it aided you in understanding the self-instructional materials? _____ Yes _____ No

a. State how the telelecture series helped you or why it failed to help you. ____

b. How could the telelecture series have been improved? __________

____

3. Did you learn any new ideas from your study of interaction analysis?

_____ Yes _____ No

a. List these ideas. ____

____

____

____

b. Have you discussed these ideas with any other teachers? _____ Yes

_____ No

c. Have you been able to apply any ideas or innovations that were generated by your study of the materials? _____ Yes _____ No

d. If your answer is yes, briefly discuss the application of these ideas. ____

____

____

____

e. What conditions would have helped you apply the ideas gained from the study?____

____

4. List what you feel were the strong and weak points of the study.

a. Strong points: ____

____

____

____

b. Weak points: ____

____

____

____

APPENDIX E

Teacher Code No._______
School Code Letter________
Subject Area Tapped______

INSERVICE COURSE EVALUATION

Directions: Answer the following multiple choice items by putting a letter on the line at the left.

________1. Which of the following statements best represent the purpose of interaction analysis?

a. To provide insights into the personality problems of students.
b. To aid the teacher in studying and evaluating her own classroom behavior.
c. To aid the teacher in understanding how students learn.
d. To aid the teacher in planning daily assignments.

________2. One of the major points made in the introduction is:

a. Teachers need to know more about how students learn.
b. Teachers frequently do not understand students.
c. There is a great need to study the act of teaching in its natural habitat.
d. To improve teacher effectiveness, greater emphasis should be given to a knowledge of subject matter.

________3. Interaction Analysis is designed to:

a. Evaluate the effectiveness of a teacher.
b. Be used as an in-service education device for teachers.
c. Provide feedback to a principal or supervisor.
d. Measure pupil achievement.

________4. In recording the verbal behavior in a classroom one should decide which of the ten categories represents the verbal interchange taking place and make a notation of this every

a. five seconds
b. twenty seconds
c. ten seconds
d. three seconds

________5. Facts that should be recorded prior to making an interaction analysis observation are:

a. Subject area
b. Grade level
c. Ability and achievement levels of class
d. All of the above

____6. If more than one type of verbal activity occurs during the designated recording period, one should

a. Disregard the change
b. Continue recording at the same tempo
c. Record each change of verbal activity regardless of the frequency
d. None of the above

____7. As an observer records verbal interchange, he must ask himself

a. What is the teacher attempting to do?
b. How does this relate to the content?
c. What effect does the teacher's statement have on the student?
d. How does this relate to the teachers' lesson plan?

____8. Which of the following types of activity is not appropriate for interaction analysis?

a. Discussion
b. Lecture
c. Workbook assignments
d. All of the above

____9. The manual suggests that the original recording of classroom verbal interaction be done in

a. rows of twenty numbers.
b. columns of twenty numbers.
c. rows of thirty numbers.
d. columns of thirty numbers.

____10. The matrix used with interaction analysis is

a. a grid with twenty rows and twenty columns.
b. a grid with fifteen rows and ten columns.
c. a grid with ten rows and five columns.
d. a grid with ten rows and ten columns.

____11. How many different cells are contained in the matrix?

a. 100
b. 75
c. 50
d. 25

____12. The I.D. Ratio reveals for the data plotted in the matrix

a. the number of new ideas presented.
b. the percentage of student talk.
c. whether the teacher was direct or indirect.
d. the percentage of teacher talk.

____13. The Revised I.D. Ratio reveals for the data plotted in the matrix

a. the method of motivation and control used.
b. whether the teacher is direct or indirect.
c. the number of new ideas presented.
d. the ratio of silence to teacher talk.

____14. What are the major divisions of teacher-talk as classified by the Flanders System?

________________________a.

________________________b.

____15. What are the major divisions of student-talk as classified by the Flanders System?

________________________a.

________________________b.

Directions: Classify the following statements by writing the Flanders category code number on the line to the left.

____16. "That's good, Joan."
____17. "Open your books to page 39."
____18. "How would you define the word 'highway'?"
____19. "No, that's not quite right."
____20. "Mark Twain is the pen name of Samuel Clemens."
____21. "I understand how you feel, Betty."
____22. "What is your impression, John?"
____23. "John has stated that Charleston is the capital of West Virginia."
____24. "Hubert is the vice-president's first name."
____25. "Sit down, Joe."

Directions: Please respond to the following by writing true or false on the line to the left of each item.

__________26. Jokes by the teacher are recorded as 5's.
__________27. Directions by the teacher are recorded as 6's.
__________28. All classroom activities are appropriate for categorizing.
__________29. Questions initiated by students are recorded as 4's.
__________30. Teacher acceptance of pupil ideas is recorded as a 3.
__________31 All statements by the teacher which restrict student behavior are recorded as 9's.
__________32. All teacher statements that praise or encourage student responses are recorded as 2's.
__________33. Categories representing the verbal interaction are recorded on the matrix in pairs.
__________34. The total number of tallies recorded on the matrix should be one more than the total numbers entered on the original observation record.

__________35. Each matrix should represent only one type of classroom activity; e.g., lecture, discussion, etc.

Directions: Match the following terms with their appropriate definition or description given in List A.

_____36. Steady state cells
_____37. Column ten
_____38. Extended direct influence area
_____39. Content cross
_____40. Transitional cells
_____41. Teacher response to student talk area
_____42. Student talks following teacher talk area
_____43. Extended indirect influence area

LIST A

A. All cells denoting movement from one category to another.

B. Identified by a heavy concentration of talking in rows 4 and 5 and columns 4 and 5.

C. Cells that run along a diagonal line of the matrix that indicate sustained talk in a single category.

D. Reveals the ratio of indirect to direct influence.

E. That area of the matrix which includes rows 1, 2, and 3 and columns 1, 2, and 3.

F. Reveals the type of teacher or pupil talk that is followed by silence or confusion.

G. Reveals ratio of teacher talk to student talk.

H. Area of matrix enclosed by rows 8 and 9 through columns 1 through 7.

I. Focuses on the teacher's use of authority.

J. Found by inspecting columns 8 and 9.

APPENDIX F

MATRIX OF PI COEFFICIENTS COMPUTED FROM AN ANALYSIS OF A SAMPLE TAPE BY 12 RATERS AT THE TERMINATION OF THEIR TRAINING (JANUARY, 1968)

Raters

Raters

1	2	3	4	5	6	7	8	9	10	11	12
1	.91	.93	.94	.88	.95	.95	.91	.94	.88	.91	.92
	2	.90	.92	.92	.95	.95	.91	.91	.92	.94	.95
		3	.95	.89	.91	.91	.89	.95	.92	.85	.91
			4	.94	.94	.94	.92	.95	.97	.89	.94
				5	.91	.91	.91	.89	.94	.88	.95
					6	.89	.88	.94	.92	.95	.89
						7	.92	.91	.91	.95	.92
							8	.86	.89	.91	.91
								9	.92	.88	.89
									10	.88	.91
										11	.92
											12

MATRIX OF PI COEFFICIENTS COMPUTED FROM AN ANALYSIS OF A SAMPLE TAPE BY 11 RATERS IN APRIL, 1968

Raters

1	2	3	4	5	6	7	8	9	10	11
1	.93	.84	.81	.76	.75	.83	.92	.83	.91	.91
	2	.81	.85	.65	.72	.81	.89	.80	.92	.92
		3	.80	.71	.84	.85	.88	.88	.81	.89
			4	.72	.72	.84	.84	.78	.85	.87
				5	.80	.76	.71	.79	.69	.71
					6	.81	.73	.89	.71	.79
						7	.85	.87	.84	.85
							8	.83	.95	.92
								9	.80	.87
									10	.92
										11

Raters

MATRIX OF PI COEFFICIENTS COMPUTED FROM AN ANALYSIS OF A SAMPLE TAPE BY SIX RATERS IN JULY, 1968

Raters

Raters	1	2	3	4	5	6
	1	.93	.87	.95	.96	.89
		2	.85	.95	.93	.88
			3	.84	.88	.91
				4	.93	.88
					5	.91
						6